INFLUENCING ON BOARDS

By

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To Liana.

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We developed a theory on influencing between the board of directors and management, using an agency model to represent the relationship between a corporation's board and management. Management has the option to affect how directors interpret information related to its performance; it can potentially make directors interpret information more in favor of management, giving it more credit for good news and less blame for bad news. This particular aspect of the interaction between the board and management is the focus of our study. We view the board as a corporate-governance mechanism, whose role is to monitor and compensate management; and analyze how influencing affects its behavior, with emphasis on its effectiveness as a corporate-governance mechanism. Standard intuition suggests influencing is detrimental to the board and shareholders. However, our analysis shows that influencing, depending on its characteristics, can be efficient. It can be used as a partial substitute for monitoring and can reduce the manager's risk exposure. Furthermore, in cases where the manager can use influencing to facilitate shirking, the board preemptively increases monitoring; this can result in social-welfare gains. Our analysis includes cases with costless

influencing, cases where influencing is personally costly for the manager, and cases where influencing impacts the manager's productivity. For costless influencing, the board cannot prevent the manager from influencing. However, when influencing is personally costly for the manager, the board can prevent influencing by increasing its monitoring intensity; this can also lead to social-welfare gains. Finally, we analyze a case with multiple sources of information, some of which are not subject to influencing, and discuss the board's and management's behavior. Overall, influencing can be efficient, and the board can be an effective corporate-governance mechanism, despite influencing.

CHAPTER 1
INTRODUCTION

Prologue

Berle and Means's (1932) seminal work emphasized the potential conflicts of interest stemming from the separation of ownership and control of modern corporations. The owners of corporations delegate their authority to a board of directors (BoD), that in turn hires a manager to run the daily operations. The BoD is commonly considered a corporate-governance mechanism whose main role is to mitigate the conflict of interests between management and shareholders (Jensen 1986, Shleifer and Vishny 1997). The BoD nevertheless is itself an endogenously determined mechanism, potentially affected by other corporate-governance mechanisms, management, other stakeholders, and the overall environment of each corporation (Hermalin and Weisbach 1998, Demski 2004). Most importantly, the BoD interacts with management on a frequent basis, and management may have incentives to affect any decisions of the BoD that affect its welfare.

Our study focused on a particular aspect of the interaction between BoD and management; management can influence how directors interpret information. Influencing includes all of management's actions that result in changing the BoD's original beliefs about information on the management's performance. We treat influencing as a black box, and do not elaborate on specific actions; nevertheless, influencing might be the outcome of inevitable personal interaction between the manager and BoD, or the result of managers affecting the "quality" of information channeled to the BoD. A manager's welfare depends, of course, on the realization of some performance signals (e.g., sales, earnings, and stock price); however, it

also depends critically on the meaning and significance attached to that signal by the board. As a result, managers may have incentives to spend time and effort influencing BoDs.

Our work is closely related to Milgrom (1988) who introduced the notion of influencing, and Hermalin and Weisbach (1998) who developed a bargaining model with endogenous monitoring. We bring the two studies together by introducing influencing in a corporate-governance setting. We explore the implications of influencing using a principal-agent model in which the BoD monitors and compensates the manager, and the manager has the option to influence how the BoD interprets information. In particular, we focus on the effects of influencing on the effectiveness of the BoD as a corporate-governance mechanism with emphasis on the BoD's decisions of monitoring and compensating the manager. We also explore the overall implication of influencing for the severity of the conflict of interests between the BoD and management, and between the BoD and shareholders.

Standard intuition suggests that influencing is detrimental to shareholders and BoD. Our analysis shows that this is not necessarily true. We begin our inquiry by examining cases where influencing is costless to the manager and has no impact on productivity. We show that influencing, depending on its characteristics, can result in efficiency gains. Influencing can be beneficial by reducing the manager's risk exposure, which in turn leads to overall efficiency gains. In other cases, influencing aggravates the severity of the conflict of interest between BoD and management; intuitively, influencing makes shirking a more attractive option for the manager, by giving him the option to cover his tracks. However, our study shows that a rational BoD does not allow the manager to exploit such an eventuality. The BoD preemptively increases monitoring to counteract and negate the specific characteristics of influencing that make shirking more attractive. Note

that the BoD cannot directly prevent the manager from influencing; however, in equilibrium the BoD ensures that the manager's actions reflect the BoD's best interests, and that the manager does not extract any rents. The effects of influencing are more subtle, in the sense it is the threat of using influencing to facilitate shirking that prompts the BoD to respond by increasing monitoring; the increase in monitoring makes the combination of shirking and influencing a less attractive option for the manager. This particular response by the BoD is important in cases with conflicts of interest between shareholders and the BoD. The model is set up so the BoD monitors weakly less than what shareholders would have, had they been making the monitoring decisions. In such cases, if influencing prompts the BoD to increase its monitoring, the conflict between the BoD and shareholders is alleviated. Furthermore, depending on the "severity" of the conflict between the BoD and shareholders, the increase in monitoring can result in social-welfare gains.

Our study also explores settings with personally costly influencing for the manager. We find that the manager's choice of influencing depends directly on his personal cost of influencing, and indirectly on the BoD's monitoring intensity. For sufficiently high personal cost, the BoD can prevent the manager from influencing. Also, monitoring makes influencing a less attractive option for the manager; in some cases, higher monitoring allows the BoD to prevent the manager from influencing. In addition, the BoD may be better off when the manager does not influence; consequently, in such cases the BoD increases its monitoring to prevent influencing. This suggests that in the event shareholders control the manager's personal cost of influencing, they can indirectly motivate the BoD to increase its monitoring by making influencing more costly. Importantly, in such a case, the shareholders are not penalizing themselves by making influencing more costly, since in equilibrium he does not influence. As before, higher monitoring alleviates the

conflict of interests between the BoD and shareholders, and potentially leads to social welfare gains.

Finally, we explore the implications of influencing that also affect the manager's productivity: influencing takes time and effort that would have otherwise been used in productive activities. We also allow for the possibility of multiple sources of information, some of which are not be subject to influencing. Contracting on the "untainted" information allows the BoD to prevent the manager from influencing. Also, influencing affects informativeness: it increases the informativeness of some signals, and decreases the informativeness of others. However, the overall effect of influencing on informativeness remains an open question.

Overall, we find that the manager's influencing option affects informativeness. Depending on its characteristics, influencing can improve or degrade informativeness. Also, the BoD is not a passive recipient of influencing. If the manager can use influencing to damage the BoD, the BoD "fights back" by increasing monitoring. Influencing can also lead to social welfare gains. This is achieved directly through improvements in informativeness, and indirectly through prompting higher monitoring by the BoD. Despite influencing, the BoD can be an effective corporate governance mechanism, and influencing can lead to social welfare gains.

Motivation and Contribution

Directors are the custodians of shareholders' interest; consequently, their decisions and actions are crucial to shareholders' welfare. Recent corporate-governance failures (e.g., Worldcom, Enron, Adelphia, and the NYSE) highlight the importance of functional and effective corporate-governance mechanisms. Accordingly, the BoD's decision-making process and the factors affecting it are crucial to our understanding of the BoD's internal-workings and its effectiveness as a corporate-governance mechanism. What if management can affect

that decision-making process or the information used by BoDs? Can the BoD be an effective corporate-governance mechanism despite interventions by management? Are the shareholders worse off when managers can influence the BoD? These are some of the questions we address, with emphasis on the effects of management's actions aimed at affecting the BoD's decision-making process. Theoretical work on interactions between BoDs and managers has been limited (Hermalin and Weisbach 1998 and Hermalin 2003 are notable exceptions); consequently, our understanding of the interactions between the two parties is limited. Our study helps us appreciate the dynamics of the relationship of BoDs and managers, and enhances our understanding of their interactions. It also helps empirical research by providing a theoretical framework for the internal-workings of BoDs and management. As we discuss in our literature review, researchers typically approach BoDs as exogenously determined institutions; however, our analysis stresses the fact BoDs and their actions are endogenously determined.

The notion that managers would try to influence the BoD's beliefs, to serve their interests, seems natural to us. Nevertheless, we do not have a good sense on the implications of such acts. Could influencing be beneficial or even encouraged by the BoD? These are important questions that we address.

CHAPTER 2
LITERATURE REVIEW

Introduction

In this chapter we selectively survey articles on the characteristics, actions, and the overall effects of BoDs in corporations. We begin by discussing empirical and anecdotal evidence on influencing BoDs. We then describe current research on BoDs, and highlight the major research directions. Next, we review analytical studies on interactions between BoDs and management, and discuss prior research on influencing. Finally, we critique and discuss limitations of the empirical research on BoDs, and conclude.

Influencing Evidence

> "... for all practical purposes the board is a creature of the chief executive. He alone can structure it in terms of his attitude toward its function, the types of problems brought before it, and the manner in which material is presented to it. As a practical matter he can, although not always without difficulty, change the make-up of the board and select new members". (Smith 1958 pp. 43)

Empirical evidence suggests managers influence BoDs' decisions. Shivdasani and Yermack (1999) found that the likelihood of appointing an outside director to the board is lower when the Chief Executive Officer (CEO) is involved in the selection process of new directors. A CEO was considered involved in the selection process if he was a member of the nominating committee or a member of the BoD when no nominating committee was present. Along the same lines, Beasley and Salterio (2001) found that the audit-committee is more likely to include more outsiders, beyond the mandated minimum, when the CEO does not hold the position of Chairman of the board. They also found that the

audit-committee exhibits lower levels of financial expertise when the CEO is also the Chairman. Their findings suggest the position of Chairman allows the CEO to affect the characteristics of the audit-committee, and the CEO prefers a less effective audit-committee. Vidhan and Park (2002) also found evidence suggesting the position of Chairman gives the CEO leverage over the BoD's decisions. They found that CEO turnover is significantly less sensitive to firm performance in firms where a CEO is also Chairman of the board. In addition, Cohen and Wright (2002) interviewed auditors on the effects of management on corporate-governance; respondents indicated that management affects the corporate-governance environment and consequently the effectiveness of corporate-governance mechanisms.

In a similar spirit, Bebchuk et al. (2002) provide an extensive discussion of CEO power over BoDs. They argued that CEOs have power over their BoDs, and use that power to extract rents. The CEOs' power stems from the fact they affect the nomination process of directors; BoD dynamics favor the CEO (e.g., support-the-CEO climate and lack of economic incentives to stand up to the CEO); and the CEO can affect the BoD's economic benefits (e.g., the CEO can affect appointments on other boards). They also claim the CEOs' power is limited only by the amount of "outrage" created by the proposed pay packages. They view CEO compensation as the product of a process influenced by the CEO to ensure rents, as evident by "excessive" compensation packages.

In addition to the above studies, a plethora of anecdotal evidence suggests CEOs have the power to influence the BoD's decision-making process. Most recently, the former Chairman and CEO of the NYSE, Mr. Grasso, admitted that he "recommended" potential directors to the nominating committee; the nominating committee never rejected any of Mr. Grasso's recommendations. Furthermore, the Chairman of the compensation committee was his close personal

friend. Also, Mace (1972) argued that despite appearances, BoDs do not choose a CEO's successor: the new CEO is chosen by the incumbent CEO himself. Mace claims that a BoD rarely rejects a candidate for the position of CEO who has been nominated by the current CEO. Mace argued that the incumbent CEO's intimate knowledge of the organization and its staff, allows the CEO to be in a unique position to select and nominate the most appropriate CEO to succeed him.

Furthermore, many characteristics of organizations give the appearance of CEO power over the BoD. Researchers documented that in almost 80-85% of U.S. corporations, the CEO also holds the position of Chairman of the board (Whidbee 1997, Xie et al. 2002); the position of Chairman of the board is commonly associated with controlling the flow of information to the other directors, setting the agenda, and calling the board meetings. Moreover, in at least 33% of corporations with a nominating committee, the CEO is a member of that committee (Shivdasani and Yermack 1999, Klein 1998). Direct involvement of the CEO in the decision-making process of the BoD suggests the CEO may be affecting these decisions.[1]

Also, current regulation makes it harder for shareholders to actively elect directors. Current SEC rules do not give shareholders direct access to management's proxy-soliciting materials for the purpose of nominating directors. Boards seem to be allowed to self-perpetuate, because of the potentially substantial cost imposed on candidates who are not nominated by corporations, thus providing them with weaker incentives for protecting shareholders' interests.[2] If a candidate

[1] The Sarbanes-Oxley Act of 2002 limits the CEO's involvement by requiring some BoD meetings without the presence of the CEO.

[2] On October 8th 2003, the SEC voted to seek comment on a proposal that would make it easier for shareholders to nominate candidates to BoDs of companies that have demonstrated governance problems. The proposal is still under debate.

director is nominated by the corporation's nominating committee (or its BoD when there is no nominating committee), all expenses associated with the election process are paid by the corporation; however, if a candidate is not nominated by the nominating committee, he has to pay all associated expenses (e.g., cost of circulating a separate proxy statement promoting themselves, gather support by shareholders, and other legal, mailing, and solicitation expenses). In addition, Ikenberry and Lakonishok (1993) report that proxy fights are (on average) successful almost 50% of the time. Another important element in the election process of directors is that brokers also get to vote for directors. Shares of clients who do not return proxies to the firm can be voted by the holding broker, who may have vested interests in voting with management.[3] For example, Brickley et al. (1998) show that institutional investors who may derive benefits from decisions controlled by management (such as banks, insurance companies, and trusts) are more likely to support anti-takeover amendments initiated by management. Moreover, the Sarbanes-Oxley act of 2002 seems to be geared toward bolstering BoD independence and limiting potential influencing by the CEO. For example, outside directors are now mandated on the audit-committee, and the BoD meets without the CEO.

In a related vein, Bebchuk (2004) argued that current legal rules weaken shareholders, and insulate management and BoD from shareholder intervention. Likewise, Bebchuk and Fried (2004) provide an extensive discussion on the limits of

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Nevertheless, under the proposed rules, it is relatively difficult for shareholders to nominate candidates. For example, only shareholders or shareholder groups that own at least 5% of a corporation for at least 2 years can place director nominations in the proxy.

[3] Pound (1988) discussed proxy-contests problems that may discourage their use as tools for replacing the incumbent management or directors.

market power and shareholders, that allow CEOs to influence their compensation. They argue that the market and the shareholders are unable to prevent the manager from extracting rents, mainly because current regulation makes it too costly for them to try.

In conclusion, empirical and anecdotal evidence suggest managers are able to affect BoDs' decisions. We also believe CEOs can influence BoDs through their intimate knowledge of the firm they run, private information acquired through their tenure as CEOs, and the power they have over other employees in the firm (whose positions and well-being are highly correlated to the CEO's).

Empirical Studies

The empirical literature on BoDs is quite extensive; nevertheless, Hermalin and Weisbach (2003) have successfully described empirical research on BoDs using the following system of linear equations:

$$act_{t+1} = f_1 \cdot char_t + \varepsilon_{1t} \tag{2-1}$$

$$perf_{t+1} = f_2 \cdot act_t + \varepsilon_{2t} \tag{2-2}$$

$$char_{t+1} = f_3 \cdot perf_t + \varepsilon_{3t} \tag{2-3}$$

where *char* denote the characteristics of the board (such as the percentage of outsiders, size, and committee breakdown); *act* denote actions of the board (such as replacing the CEO, establishing a compensation committee, and setting the CEO's compensation package); and *perf* denotes firm performance (such as stock returns or earnings). The value t indicates time; and $\varepsilon_{1t}, \varepsilon_{2t}$, and ε_{3t} are the error terms. Combining Equations 2-1 and 2-2, we obtain a fourth equation on firm performance and characteristics of the board:

$$perf_{t+s} = f_2 \cdot (f_1 \cdot char_t + \varepsilon_{1t}) + \varepsilon_{2t} \tag{2-4}$$

Hermalin and Weisbach (2003) highlighted the fact that the BoD's actions, its characteristics, and firm performance, are endogenously determined. Accordingly, the system of equations should be estimated simultaneously. Typically, researchers

do not estimate the system simultaneously and focus on a single equation at a time. As we discuss later, this makes it hard to interpret the results of these studies. For our empirical part of the literature review, we use Equations 2-1 to 2-4 to describe the main research directions.

Performance and Board Characteristics

Fama and Jensen (1983) underscore the importance of outsiders on the BoD. Outside directors' interests are considered more aligned to shareholders' interests relative to inside directors. As a result, the percentage of outsiders on the BoD is expected to exhibit a positive relationship to performance. Researchers have been mostly interested in how actions of the BoD affect performance (Equation 2-2), but since BoDs' actions are (for the most part) unobservable, they focused on the relationship among characteristics of the BoD and firm performance instead (Equation 2-4). Research on the importance of BoD characteristics on firm performance is extensive; nevertheless, empirical evidence has been mixed.

Hermalin and Weisbach (1991) discerned no significant evidence linking board composition to corporate performance, as measured by Tobin's Q. In a similar spirit, Klein (1998) examined board composition's association with performance using numerous variables proxying for firm performance: return on assets, after-tax income before extraordinary items, and long-term assets productivity.[4] Like Hermalin and Weisbach (1991), Klein (1998) found no significant relation between the board's composition as a whole; however, she documented a significant association between firm performance and the composition of the board's finance and investment committees: the percentage of

[4] The productivity measure of a firm's long-term assets is defined as the change in market value of a firm, minus the change in property, plant, and equipment, times the firm's cost of capital (fixed at 8%).

insiders on the particular committee is positively associated with firm performance. Likewise, Agrawal and Knoeber (1996) concluded that the percentage of outsiders on the BoD is not associated with firm value, as measured by the ratio of market to book value. Note that Agrawal and Knoeber recognized the endogenous structure of the BoD and used a simultaneous equation framework to test their hypotheses. Finally, Bhagat and Black (1999) also examined the association between board composition and corporate performance and concluded there is no conclusive empirical evidence suggesting higher proportion of outsiders on BoDs is associated with greater profitability or growth.

Contrary to the above, other studies found evidence of a positive link between firm performance and characteristics of the BoD. Kaplan and Bernadette (1994) documented a positive association between appointing outside directors on boards and the post-appointment performance of Japanese firms. Similarly, Morck et al. (1988) documented a nonlinear relationship between the BoD's firm ownership and performance, as measured by Tobin's Q. They found a positive association between ownership and performance for low and high levels of ownership, and a negative association for intermediate levels, consistent with the convergence of interests and entrenchment hypotheses. Repeating their analysis using net income as a proxy for performance, they documented a positive association only for low levels of BoD's ownership levels.

In a related vein, researchers examined the relationship between characteristics of the BoD and takeover value. Cotter et al. (1997) studied the relationship between the composition of the BoD and takeover bids. In particular, they examined whether the composition of the board had any effect on takeover bids and target shareholders' wealth. They concluded that when the target's board is independent, the initial tender offer premium, the bid premium revision, and the target shareholder gains over the entire tender offer period are

higher. They also found that the presence of a poison-pill, and takeover resistance lead to greater premiums and shareholder gains. They concluded that independent outside directors enhance target shareholder gains from tender offers, and that boards with a majority of independent directors are more likely to enhance shareholder wealth by using resistance strategies. Similarly, Brickley et al. (1994) found a positive market reaction to poison-pill announcements for companies with outsider-dominated BoDs.

Jensen (1993) argued that larger BoDs cannot be as effective as smaller boards. In line with this notion, Conyon and Peck (1998) examined the association of firm performance with board size for five European countries, and found an inverse relation to board size. Similarly, Yermack (1996) documented a positive association between firm performance measured by Tobin's Q and smaller boards. Likewise, Eisenberg et al. (1998) used a sample of small- to medium-size firms, and found a negative relation between firm size and profitability.

Board Actions and Characteristics

BoDs' duties include, among others, the selection or replacement of the manager, monitoring, and interacting with the auditor. Accordingly, researchers examined whether characteristics of the board can be associated with these choices.

Selection or replacement of the CEO is considered one of the primary duties of the BoD (Mace 1986). Therefore, researchers examined the relationship between characteristics of the BoD and decisions to replace the CEO; nevertheless, evidence is mixed. Weisbach (1988) found that the composition of the BoD is a determining factor in replacing the incumbent CEO. He concluded that performance, as measured by earnings and stock prices, is a more significant basis to replace the CEO when the BoD is outsider-dominated. At the same time though, he found weak evidence that outsider-dominated boards increase firm value when they replace the CEO. In a related study, Vidhan and Park (2002)

discerned that CEO turnover is significantly less sensitive to firm performance in firms where a CEO also holds the title of Chairman of the board. Furthermore, Borokhovich et al. (1996) found positive association between the percentage of outsiders on the BoD and the frequency of appointing an outside new CEO. It is also important to acknowledge that the decision to replace a CEO is complicated by other factors beyond the characteristics of the BoD. For example, Lorsch and Khurana (1999) argued the CEO-replacement process is complicated by factors such as companies entering new lines of business and business environment changes that force corporations to seek new skills and knowledge.

BoDs also have the ultimate authority to accept or turn down any takeover attempts. Kini et al. (1995) examined the composition of BoDs in relation to corporate-takeovers and found that takeovers, combined with CEO replacement, result in a reduction to the size of the board as well as adjustments to its composition, leading to a more balanced composition: the dominant group of directors on a board loses some positions. Another decision made by the BoD, related to takeovers, is the adoption of a poison-pill provision. Loh (1994) examined a sample of corporations that instituted poison-pill provisions, and showed that corporations that institute poison-pill provisions are more likely to have an outside director who is also director of another firm that in the past instituted poison-pill provisions. Bradbury and Mak (2000) also found evidence that outsiders on BoDs are positively related to the adoption of less restrictive anti-takeover amendments. In addition, Brickley (1994) documented a positive market reaction to announcements of instituting poison-pill provisions for outsider-dominated boards. He also showed that firms with outsider-dominated BoDs are more likely to be engaged in an auction between potential bidders. They concluded the evidence supports the notion that outside directors protect shareholders' interests. Gagnon et al. (1996) found no evidence linking board

composition to takeover resistance, but found evidence of positive association between director ownership and takeover resistance.

Arguably, one of the primary roles of the BoD is monitoring management. Accordingly, researchers have looked at the potential association between characteristics of the BoD and fraud. Beasley (1996) shows that the percentage of outside directors on a board is negatively related to the likelihood of fraud. Extending the analysis performed by Beasley, Abbott et al. (2000) examined the association between audit-committee composition and misstatements on the financial statement. They found that for corporations where audit committees are composed mainly of outside directors and meet at least twice a year, the likelihood of misstatements is significantly lower. However, they did not find evidence supporting Beasley's (1996) results. In a related study, Dechow et al. (1996) also documented that outsider-dominated boards are associated with fewer enforcement actions by the SEC for earnings manipulation.

In contrast to such evidence, Agrawal and Chadha (2003) discerned no link between the board or audit-committee composition and earnings restatements. They, however, found evidence that the likelihood of restatements is lower in corporations whose boards have at least one outside director with accounting or finance expertise. In a similar spirit, Carcello et al. (2000) looked at the association between characteristics of the board and audit quality and found a significant association between characteristics and actions of the BoD to audit fees (audit fees was used as a proxy for audit quality).[5] They attribute their results to the boards' concern to fulfill their monitoring role, by supporting the audit function.

[5] Board independence is measured by the percentage of outside directors on the board, diligence is measured by referring to the number of board meetings that occurred during the year, and board expertise is measured by the average number of other directorships held by outside directors.

In a related study, Klein (2002a) documented a negative association between characteristics of the BoD and "abnormal" accruals. "Abnormal" accruals are, typically, associated with earnings "quality". She found that the percentage of outsiders on the audit-committee and the board, is negatively associated with "abnormal" accruals. She interprets this as evidence that outside directors prefer and ensure higher earnings "quality." Also, Xie et al. (2002) documented a negative association between earnings management and the proportion of outsiders and directors with corporate experience. They also documented a negative association between the proportion of audit-committee members with corporate, investment, or banking backgrounds, to earnings management. In a related vein, Ajinkya et al. (2003) examined the association between characteristics of the BoD and management earnings forecasts. They found that the likelihood of management earnings forecasts and the frequency of such forecasts are positively associated with the percentage of outsiders on the BoD. They also found that the percentage of outsiders is associated with more-accurate and less-biased forecasts. Importantly, the authors acknowledge potential endogeneity issues, and show that their results hold after controlling for it.

Managing the relationship of the corporation and its auditor is also among the duties of the BoD. Carcello and Neal (2003) found evidence to support the notion that more independent audit committees, with more governance expertise and "small" ownership percentage, are more likely to stop management from attempting to dismiss the auditor who is about to issue a going-concern report. They found that the members of the audit-committee, and not the other members of the board, play a significant role in the auditor dismissal process. They also found that when clients receive a going-concern report, the subsequent turnover rate among outside audit-committee members is significantly greater when the client dismisses the auditor, than when the client retains the auditor. Carcello and

Neal (2000) also found evidence suggesting outside auditors are less likely to issue going-concern reports to financially distressed clients, whose audit committees lack independence (higher proportion of insiders). They argued that the results of the two studies support the notion that when the audit-committee is "management controlled", management seems to be able to pressure outside auditors to issue unmodified opinions, and dismiss them if they issue a going-concern opinion.

In line with this evidence, Beasley and Salterio (2001) linked characteristics of the board to characteristics of the audit-committee. They found it is more likely that firms include more outsiders on the audit-committee (beyond the mandated majority) and improve the financial expertise of the audit-committee, when firms have more outsiders on the BoD. Their evidence suggest that the characteristics of the audit committee are endogenously determined. Klein (2002b) found a similar link between the composition of the BoD and the composition of the audit committee. She also found that the proportion of insiders on the audit committee is more likely to go up when firms exhibit consecutive losses. The proportion of insiders also goes up with the firm's growth opportunities, as proxied by a variation of the market to book ratio.

Board Characteristics

BoDs' decisions depend on the BoD's characteristics. Accordingly, the characteristics of the BoD play an important role on its effectiveness as a corporate-governance mechanism (Fama and Jensen 1983). In line with this argument, researchers examined factors that affect the characteristics of the BoD. Hermalin and Weisbach (1988) examined the association between firm performance (captured by stock returns) and the composition of the board. They found that, following poor performance, inside directors are replaced by outsiders. Their analysis suggests firm performance is a determining factor of BoD composition. Similarly, Kaplan and Minton (1994) found that following negative income, new

outsiders are appointed to the BoD; however, they found no link between negative stock performance and director appointments.

In a similar spirit, Weisbach (1988) found that the proportion of outsiders on a BoD is inversely related to the ownership holdings of the top two officers of corporations, suggesting management can influence the selection of directors on the board. Moreover, Whidbee (1997) examined the composition of BoDs in publicly traded bank holding companies, and found that the percentage of outside directors is greater with institutional and outside director ownership. Whidbee (1997) also found a negative relation between the percentage of outsiders on the board and management ownership. The results of these studies suggest a direct link between ownership and composition of the board.

Other corporate-governance mechanisms may also be affecting characteristics of the BoD. Bathala and Rao (1995) focused on the effects of alternative corporate-governance mechanisms on the composition of the BoD. They found the proportion of outsiders on a board is inversely related to the debt ratio, insider ownership, institutional holdings, growth, CEO tenure length, and the dividend payout ratio. Their results suggest the existence of substitute corporate-governance mechanisms. Likewise, Klein (2002b) found that the proportion of outsiders on the audit committee is negatively associated with the presence of a 5% non-management audit committee member. Furthermore, as discussed earlier, Beasley and Salterio (2001) show that characteristics of the board itself affect characteristics of the audit-committee.

It should also be recognized that other factors affect characteristics of the BoD. For example, Hermalin and Weisbach (1988) argued that insiders on BoDs may be "groomed" for succeeding the incumbent CEO. They found that as CEOs tend to reach retirement, corporations add insiders on the BoDs, perhaps as potential candidates for the position of the CEO. They also documented that

after a CEO change, directors with small tenures leave the board which might show these are the losing candidates. Initial public offerings (IPOs) also affect the characteristics of BoDs. Baker and Gompers (2001) examined board composition during IPOs focusing on its association with venture backing and found venture capital backed firms have fewer insiders and "grays" on their boards. Along the same lines, Mak and Roush (2000) found a negative association between BoD size and insiders ownership, and a positive association between the proportion of outsiders and growth opportunities. They also found firms with growth opportunities tend to have smaller boards.

Theoretical Studies

Theoretical studies have contributed in enhancing our understanding of the BoDs' and managers' behavior. Nevertheless, for the literature review, we focus on research that is directly related to our work: Milgrom (1988), Hermalin and Weisbach (1998), and Hermalin (2003).

Milgrom (1988) introduced the notion of influencing in the sense that employees care about firms' decisions, and consequently may spend time and effort trying to influence these decisions. He developed a model where employees allocate their effort between productive and influencing activities. When influencing is successful, by assumption both the employees and the firm benefit: employees receive additional compensation and the firm benefits by means of added flexibility and potentially higher profits. Influencing is costly to the firm though, because it takes effort and time that would have otherwise been used in productive activities. Milgrom shows that it is best to prevent influencing in cases where the associated benefits to the organization are relatively low but the associated benefits to employees are high.

Hermalin and Weisbach (1998) proposed a bargaining model between management and BoD and examined mainly how the BoDs' independence is

affected. They assume management and the BoD bargain over the CEO's wage and independence of the board and show that as long as CEOs are not dismissed, BoDs lose more of their independence and monitor less over time. They also show that more independent BoDs are more likely to replace the CEO following poor performance.

Hermalin (2003) builds on Hermalin and Weisbach (1998) and develops a model of BoD monitoring, hiring, and retaining or firing the CEO. He shows that higher BoD vigilance can be associated with the following trends: external candidates become CEOs more frequently, the average tenure of CEOs decreases, and both CEOs' effort and compensation increase.

We bring the works of Milgrom (1988), Hermalin and Weisbach (1998), and Hermalin (2003) together by introducing influencing in a corporate-governance setting. We explore the effects of the manager's option to influence the BoD's beliefs, in a setting where the BoD's role is to monitor and compensate the manager. We examine the effects of influencing in detail, and analyze three variations of influencing. Initially, we examine the effects of influencing that is not costly for the manager, nor does it affect his productivity. We then analyze influencing that is personally costly for the manager, and finally explore the effects of influencing that impacts the manager's productivity.

Critique

There are several important issues that we need to consider, when evaluating empirical research on BoDs: endogeneity; lack of formal theory; presence of alternative corporate-governance mechanisms; out-of-equilibrium results; and delegation of authority within boards. Most of these issues apply to the majority of the studies reviewed, to varying degrees. Of course, many researchers have acknowledged many of these issues and addressed them (e.g., Agrawal and Knoeber 1996 and Ajinkya et al. 2003).

Our major criticism of the existing literature is an obvious lack of concern about endogeneity. The majority of empirical studies are plagued by endogeneity issues that make it difficult to interpret their results. Boards operate within organizations and interact with their management, employees, and other stakeholders. Furthermore, BoDs not only are affected by their environment, but the BoD also affects the environment itself. For example, firm performance may affect the characteristics of the BoD, but at the same time, characteristics of the BoD affect performance. Ignoring the endogenous nature of these variables may lead to biased results or in some cases to completely opposite conclusions. For example, Whisenant et at. (2003) estimate audit and non-audit fees using a system of simultaneous equations. They found no evidence of economies of scope from the joint provision of audit and non-audit fees contrary to prior studies (e.g., Simunic 1984). Likewise, Antle et al. (2002) consider non-audit services and accruals as endogenously determined choices and documented a negative association between non-audit services purchased and "abnormal" accruals. Again, this is contrary to studies that did not address endogeneity (e.g., Frankel et al. 2002).

Moreover, an important inherent limitation of empirical research is lack of formal theory. There seems to be no theoretical background on which empirical studies rely to test their hypotheses. The majority of empirical studies make at best little reference to theory, and in many cases ignore equilibrium arguements. As a result, important characteristics of an issue examined may be missed (e.g., endogeneity). The importance of sound theory has been eloquently stressed in Sims (1996).

In addition to this, we need to take into consideration that BoDs are only one corporate-governance mechanism that operate in the presence of other corporate-governance mechanisms, such as debt-holders, managerial ownership, and litigation. Each of these mechanisms does not exist, or operate, in isolation from

the other mechanisms. These mechanisms may be substitutes, complements, or simply interact with each other. For example, BoDs may be much more effective as a corporate-governance mechanism in the presence of large shareholders on the board. As such, studies that fail to take into consideration the effects of the presence and interactions among the various corporate-governance mechanisms in corporations produce difficult to interpret results

Furthermore, observed "failures" attributed to the ineffectiveness of BoDs may be the result of out-of-equilibrium behavior by management. Using out-of-equilibrium behavior to make equilibrium behavior inferences produces misleading findings. Any associations found may be the result of some spurious relationship between variables used in the study and the out-of-equilibrium outcome. For example, the collapse of Enron is attributed to fraud; we believe fraud is not equilibrium behavior.

Another potential issue with current research is the fact that not all decisions are made by boards as a group. BoDs often use committees that are assigned specific tasks: audit, executive, finance, investment, nominating, and compensation committees are some examples. The existence of these committees means some decisions traditionally viewed as being made by the entire board are in fact made by only a subset of the board. Most empirical studies examined the association of the composition of the board in relation to some action or event in the corporation. However, the relevant decision or action of the board may have been taken by some committee whose characteristics are different from the characteristics of the board.

Our criticism is not meant to imply empirical research is not useful. Despite its potential shortcomings, empirical research has helped us learn a lot about BoDs and their role in firms. As evidenced by the range or issues analyzed in empirical studies, there has been extensive work on what BoDs do and what factors affect

them. As Hermalin and Weisbach (2003) point out, empirical research is fairly developed; nevertheless, because of its potential shortcoming, we must be careful when evaluating empirical studies.

Conclusions

Existing literature on BoDs is extensive. Our review covers a small fraction of the existing literature; however, it is indicative of the major research directions in this area. Empirical research has addressed questions such as what factors affect BoDs, and what BoDs do. Nevertheless, empirical research is plagued by important issues that we need to consider. Its major limitations are the lack of solid theoretical foundation and the consequent under attention to the endogenous nature of the characteristics of the BoD and management, their actions, and their effects on various aspects of firm performance. Ignoring these issues can produce results that are difficult to interpret.

As discussed earlier, Hermalin and Weisbach (2003) have cogently described empirical research on BoDs using a system of linear equations. Typically, researchers estimate only one of the equations. Theory, and our study, suggest the system should be estimated simultaneously. To the extent decisions such as monitoring, compensating, and retaining a CEO are made simultaneously by different players, the correct approach is a system of simultaneous equations estimated using a two or three stage least square model. In many cases, instrumental variables can also address endogeneity.[6] At the very least, the endogenous nature of the BoD's, management's and other stakeholders' actions and characteristics has to be recognized.

[6] For more information on the effects of endogeneity and how to address it refer to Greene (2000) and Woodridge (2001).

CHAPTER 3
MODEL SETUP AND BENCHMARK

Introduction

This chapter presents the structure of our basic model, the sequence of events, and a benchmark case. The benchmark, a standard principal-agent model with no-influencing, is used throughout our analysis. The model is expanded in chapters 4 and 5 to include personally costly influencing for the manager and productivity cost respectively. This chapter is organized as follows. We begin with the time line, followed by the characteristics of the players involved. Finally, we analyze the benchmark case, and conclude.

Time Line

Consider an ongoing firm with a BoD that hires a manager to provide some productive input. The game has five stages with the following timing (Figure 3-1). At the start of the game, time 0, the BoD offers a compensation contract to the manager. If the manager accepts the contract, the BoD sets monitoring intensity at time 1. This is followed by the manager choosing productive and influencing effort levels at times 2 and 3 respectively. Finally, at time 4, payments are made to the manager as specified in the contract. As we later discuss, the sequence of events at times 1, 2 and 3 is inconsequent; however, it is important that the manager is offered a contract before he takes any actions (productive effort and influencing), and influencing takes place prior to the realization of the contracting variables.

The Players

The BoD is a self-serving risk neutral syndicate with utility $U^B = \alpha[x - s] - c(\gamma)$; x is firm output, s is the manager's compensation, $c(\gamma)$ is the

BoD's monitoring cost as a function of monitoring intensity γ, and $\alpha \in [0,1]$ is an exogenous "value" weight.[1, 2] Intuitively, α is the BoD's ownership share of the firm.

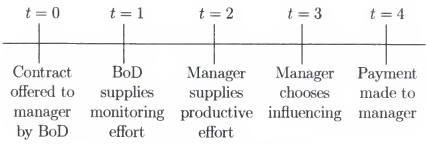

Figure 3–1: General time line

Shareholders are also a self serving syndicate with utility $U^S = (1-\alpha)[x-s]$. Following Hermalin and Weisbach (1998) shareholders are passive participants that simply ratify the corporate slate, and exist for risk sharing purposes.

For social-welfare purposes, define social utility as the sum of the BoD's and shareholders' utility: $[x-s]-c(\gamma)$.[3] This means α is a congruence measure that captures the degree of alignment between the BoD's personal interests and social-welfare.

The manager is risk averse with negative exponential utility $U^M = -\exp[-r(s-c(\theta))]$; r is the Arrow-Pratt measure of absolute risk aversion and $c(\theta)$ is the manager's personal cost of effort as a function of productive effort θ. Let

[1] Wilson (1968) defined a syndicate as a group of individual decision makers who must make a common decision under uncertainty, and who, as a result, will receive jointly a payoff to be shared among them.

[2] Interactions among directors on the board are beyond the focus of this study and are accordingly not explicitly modeled.

[3] As we later show, the manager does not extract any rents, so adding the manager's utility on social utility does not affect our analysis on social welfare.

$\hat{\imath}$ denote the manager's opportunity certainty equivalent and without loss of generality set $\hat{\imath} = 0$. The manager supplies an unobservable productive input, hereafter productive effort, that stochastically results in firm output. Productive effort is denoted by θ and for simplicity is binary, $\theta \in \Theta \equiv \{H, L\}$ with $H > L$; H indicates high productive effort and L indicates low productive effort. Without loss of generality we normalize $c(L) = 0$ and denote $c(H) \equiv C > 0$. If the manager is indifferent between the two levels of effort, he supplies high productive effort. The BoD prefers high productive effort at all times.

The real output of the firm is unobservable during the contracting horizon of the manager. For contracting purposes, the BoD and manager rely on an accounting report y. For simplicity, y is a binary signal: $y \equiv \{g, b\}$ where "g" and "b" indicate good and bad news respectively. The relationship between the manager's productive effort and the outcome of the accounting report is given by the probabilities of the accounting signal y, parameterized by the manager's effort supply: $\pi(g|H) = \pi_H$ and $\pi(g|L) = \pi_L$ with $1 > \pi_H > \pi_L > 0$ and $\pi_H > \frac{1}{2}$.

The BoD can improve informativeness at personal cost. Throughout the paper, we call any BoD's actions that improve the informativeness of the accounting report regarding the manager's productive effort as "monitoring." Monitoring is stylized as increasing the likelihood of good news when the manager supplies high productive effort, and decreasing the likelihood of good news when the manager supplies low productive effort. Let γ denote the BoD's monitoring intensity level, which is binary for simplicity, $\gamma \equiv \left\{\underline{\gamma}, \overline{\gamma}\right\}$. We normalize $\underline{\gamma} = 0$ and let $\overline{\gamma} > 0$; $\overline{\gamma}$ and $\underline{\gamma}$ indicate high and low monitoring intensity respectively. The BoD incurs personal cost of $c(\gamma)$ for γ monitoring intensity, and without loss of generality normalize $c\left(\underline{\gamma}\right) = 0$ and denote $c\left(\overline{\gamma}\right) = c > 0$. Monitoring alters the probabilities of the accounting report, given productive effort and monitoring, such that for some $\gamma : \pi(g|H, \gamma) = \pi_H + \gamma$ and $\pi(g|L, \gamma) = \pi_L - \gamma$. As we show later,

$\overline{\gamma}$ improves the informativeness of the accounting report. Intuitively then, high and low monitoring intensity can be perceived as high and low information "quality" respectively.

Table 3–1: Monitoring and influencing effects on monitoring signal

	Accounting report y	
	g	b
$\pi(y\|H,\gamma,\beta)$	$\pi_H+\gamma+\beta$	$1-\pi_H-\gamma-\beta$
$\pi(y\|L,\gamma,\beta)$	$\pi_L-\gamma-\beta$	$1-\pi_L+\gamma+\beta$

The manager can influence the BoD's original interpretation of the accounting report through influencing actions.[4] When the manager influences the BoD, the BoD interprets information more in favor of the manager relative to no-influencing cases. Influencing then is as if affecting the distribution of the accounting report. Let β denote the influencing effort level of the manager and assume it is unobservable. Influencing affects the probabilities of the accounting report, parameterized by productive effort and monitoring, so $\pi(g|H,\gamma,\beta) = \pi_H+\gamma+\beta$ and $\pi(g|L,\gamma,\beta) = \pi_L-\gamma-\beta$. For simplicity, influencing is symmetric and takes one of three values: $\beta \in B \equiv \{-\overline{\gamma}, 0, \overline{\gamma}\}$. Throughout the paper we call $\beta = -\overline{\gamma}$, $\beta = 0$, and $\beta = \overline{\gamma}$ negative, neutral, and positive influencing respectively. The effects of influencing on the probabilities of the "g" and "b" accounting reports are illustrated in Table 3–1. Influencing is, initially, costless for the manager and does not impact productivity.[5] Intuitively, high productive effort followed by positive influencing increases the likelihood of good news; similarly, low productive effort followed by negative influencing increases the likelihood of good news.

[4] The focus of this study is the implications of influencing and not influencing actions per se, so we leave it to the reader to interpret how managers influence BoDs.

[5] We analyze settings with personally costly influencing for the manager in Chapter 5, and settings with productivity cost of influencing in Chapter 6.

Furthermore, assume the following conditions hold regardless of β and γ:

$$\pi_H > \pi_L - \beta \tag{3-1}$$

$$1 > \pi_H + 2\overline{\gamma} > \pi_L - 2\overline{\gamma} > 0 \tag{3-2}$$

as well as an additional technical requirement

$$\exp(-rC) > \frac{1 - \pi_H - \gamma - \overline{\gamma}}{1 - \pi_L + \gamma - \overline{\gamma}} \tag{3-3}$$

Condition 3-1 is to maintain consistent labeling, 3-2 ensures full support, and 3-3 guarantees incentive compatibility constraints are feasible.[6, 7]

The contract offered to the manager is a function of the observable accounting report y and monitoring intensity γ, $s(y, \gamma)$. Throughout the paper, we assume the BoD can costlessly commit to the monitoring intensity level specified in the compensation contract.[8, 9] This means the sequence of events at time 1, 2 and 3 is inconsequent. It is important though that the particular events take place prior to the realization of the accounting report at $t = 4$. Finally, assume the noted structure of the game is common knowledge.

Benchmark

We begin the analysis by examining a no-influencing case that we use as a benchmark throughout our study (Figure 3–2). The BoD's objective is to minimize the sum of expected compensation and monitoring cost while ensuring high

[6] Condition (3-1) ensures the "g" signal is more likely when the manager supplies high productive effort regardless of monitoring and influencing.

[7] For a more detailed analysis, see Christensen and Demski (2003) pages 250-251.

[8] An alternative equivalent scenario calls for observable and contractible monitoring intensity. The compensation contract would then be a function of the monitoring signal and the actual level of monitoring, $s(y, \gamma)$, and if $\gamma = \hat{\gamma}$, then $s(y, \gamma) = +\infty \; \forall \; \gamma \neq \hat{\gamma}$.

[9] Including monitoring in the contract is also consistent with prior studies such as Dye (1986) and Huddart (1993).

productive effort. The individual rationality (IR) constraint ensures the manager accepts the compensation contract, and the incentive compatibility (IC) constraint ensures the manager supplies high productive effort.[10] There are no incentive compatibility issues regarding the BoD's monitoring since we assume the BoD commits to supplying the monitoring intensity level specified in the compensation contract. The BoD's optimization program in the benchmark scenario (Program A) is the following:

$$\min_{s(y,\gamma),\gamma} \alpha E\left[s|H,\gamma\right] + c\left(\gamma\right)$$

$$s.t.$$

$$E\left[U^M|s,H,\gamma\right] \geq -1 \qquad (IR)$$

$$E\left[U^M|s,H,\gamma\right] \geq E\left[U^M|s,L,\gamma\right] \qquad (IC)$$

Solving Program A we obtain the optimal compensation contract offered to the manager. Importantly, good news is rewarded: $s\left(g,\gamma\right) > s\left(b,\gamma\right)$.[11]

Lemma 1: In the benchmark case, any compensation contract motivating high productive effort, $\theta^* = H$, has $s(g,\gamma) > s(b,\gamma)$.

Deriving an explicit relation between monitoring cost and the BoD's monitoring choice is cumbersome; however, if monitoring is costless, higher monitoring leads to strictly positive monitoring gains, where monitoring gains to the BoD are denoted by $G\left(\alpha\right)$ and defined as follows:

$$G\left(\alpha\right) = \alpha\left\{E\left[s^*_{\underline{\gamma}}|H,\underline{\gamma}\right] - E\left[s^*_{\overline{\gamma}}|H,\overline{\gamma}\right]\right\} - c \qquad (3\text{-}4)$$

where s^*_γ indicates the optimal compensation contract for γ monitoring intensity. The information system for low monitoring intensity is a garbling of the

[10] Recall that the manager's reservation compensation is zero, so his reservation utility is -1.

[11] All proofs are in the Appendix unless otherwise noted.

information system for high monitoring intensity. So, under costless monitoring, the BoD is strictly better off under high high monitoring intensity.

Proposition 1: In the benchmark case, if monitoring is costless, $c = 0$, the BoD's optimal monitoring choice is high, $\gamma^* = \overline{\gamma}$.

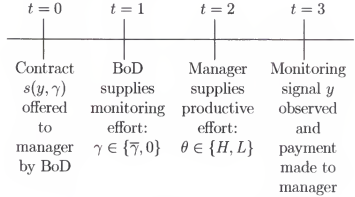

Figure 3-2: Benchmark case time line

Furthermore, if the manager is sufficiently risk averse or the cost of high productive effort is sufficiently high, the shareholders' monitoring gains exhibit decreasing returns to scale. As we discuss later, this has important implications for the BoD's monitoring behavior. The remaining of our analysis will be confined to cases where monitoring gains exhibit decreasing returns to scale.

Lemma 2: For $(r, C) \in \left\{ r, C : \exp(rC) > \frac{2+\gamma-2\pi_L-\pi_H}{2-\pi_H-\gamma} \right\}$ monitoring gains to the BoD exhibit decreasing returns to scale

$$\frac{\partial G(\alpha)}{\partial \gamma} < 0 \text{ and } \frac{\partial^2 G(\alpha)}{\partial \gamma^2} > 0 \tag{3-5}$$

For $\alpha = 1$ the BoD's interests are perfectly aligned to shareholders'. If however $\alpha \neq 1$, the BoD's monitoring intensity may differ from the socially optimal level. On the margin, directors get a share of the firm's output but pay all monitoring cost. From 3-4, the BoD's monitoring gains are a function of α, and it is easily verifiable that for $\alpha < 1$ monitoring is weakly lower than the socially optimal level of monitoring for $\alpha = 1$ (proof omitted).

Proposition 2: In the benchmark case, the BoD's monitoring choice for $\alpha < 1$ is weakly less than the socially optimal monitoring level.

In our binary setting, the difference between the monitoring gains to shareholders and the BoD implies the BoD may find it optimal to supply low monitoring intensity, when shareholders would have selected high monitoring intensity, had they been making the monitoring decisions. This constitutes the conflict of interests between the BoD and shareholders of the firm.

A numerical example should help us gain some insight on the interactions between BoD and manager. Table 3–2 summarizes parameter values and Table 3–3 shows numerical results under high and low monitoring intensity for congruence measure α. The first two rows of Table 3–3 describe the compensation contract offered to the manager followed by the BoD's expected utility, under each level of monitoring intensity. The next row shows monitoring gains resulting from increasing monitoring from low to high. The last two rows show expected utility and associated monitoring gains for $\alpha = 1$. From Table 3–3 then, the BoD's expected utility is higher under low monitoring intensity which means the BoD's optimal monitoring intensity is low. Notice however that social-welfare is maximized for high monitoring intensity.

Conclusions

This chapter presents the basic model, assumptions, and the no-influencing benchmark case. The benchmark setting is a simple principal-agent model where the BoD monitors and compensates the manager, who does not have the option to influence. Monitoring improves the informativeness of the information system; however, the model is set up so the BoD monitors weakly less than the socially optimal level. Also, monitoring gains to the BoD exhibit decreasing returns to scale. The next chapters examine how influencing affects standard intuition, by analyzing in detail three variations of influencing: costless influencing; personally

costly influencing for the manager; and influencing that impacts the manager's productivity.

Table 3–2: Summary of parameter values

Parameter	Description	Value
α	Congruence measure	0.05
r	Arrow-Pratt measure of risk aversion	0.0001
$c(H)$	High productive effort cost	2000
$c(\overline{\gamma})$	High monitoring cost	12
$\overline{\gamma}$	High monitoring intensity	0.01
$\pi("g"\|H)$	Probability of signal "g" given H	0.61
$\pi("g"\|L)$	Probability of signal "g" given L	0.39

Table 3–3: Benchmark numerical example

	$\gamma = 0$	$\overline{\gamma} = 0.01$
$s(g, \gamma)$	6983.81	6316.36
$s(b, \gamma)$	−2786.47	−2523.21
$\alpha E[s\|H, \gamma] + c(\gamma)$	158.67	159.87
$G(\alpha = 0.05)$	−1.20	
$E[s\|H, \gamma] + c(\gamma)$	3173.40	2969.32
$G(\alpha = 1)$	204.08	

CHAPTER 4
COSTLESS INFLUENCING

Introduction

We begin the analysis by examining the effects of influencing on the effectiveness of BoDs as corporate-governance mechanisms. In particular, we focus on the effects of the manager's influencing options on the BoD's decisions of monitoring and compensating management. We also discuss social-welfare implications. The analysis is limited to influencing that does not affect the manager's productivity nor is personally costly for the manager.

Our findings provide new insights into interactions between BoDs and managers. First, we show that despite standard intuition, under certain conditions influencing leads to efficiency gains. Influencing can reduce the risk imposed on the manager and consequently lower the expected compensation cost. A rational BoD does not allow the manager to extract any rents, so the risk reducing properties of influencing translate to efficiency gains for the BoD and shareholders. Second, the threat of using influencing to facilitate low productive effort prompts the BoD to increase its monitoring, so to make shirking and influencing less attractive for the manager. Third, in cases with conflict of interests between the shareholders and the BoD, in terms of monitoring intensity, influencing may serve as a catalyst for higher monitoring, thus alleviating the conflict. Depending on the severity of the conflict, the increase in monitoring can result in social-welfare gains.

This chapter is organized as follows. We begin by exploring the effects of influencing in various settings. In particular, we examine the effects of influencing in a setting where the manager can influence only after high productive effort, a

setting where influencing is independent of productive effort, and a setting where the manager can only choose between no-influencing and negative influencing. We then discuss the driving mechanism behind our results. Finally, we discuss social-welfare issues, and offer conclusions.

Influencing Analysis

Conditional Influencing Case

We now add influencing into the mix and analyze a setting where the manager's influencing option is conditional on supplying high productive effort. Intuitively, high productive effort activates the influencing option as the manager acquires necessary skills and knowledge allowing him to influence (Figure 4–1). The BoD's objective is to minimize its weighted expected compensation and monitoring cost while ensuring high productive effort (Program B). The IR constraint ensures the manager participates in the game, and the IC_1 and IC_2 constraints ensure the manager supplies high productive effort followed by β^* influencing.

$$\min_{s(y,\gamma),\gamma,\beta^*} \alpha E\left[s|H,\gamma,\beta^*\right] + c\left(\gamma\right)$$

$s.t.$

$$E\left[U^M|s,H,\gamma,\beta^*\right] \geq -1 \qquad (IR)$$

$$E\left[U^M|s,H,\gamma,\beta^*\right] \geq E\left[U^M|s,L,\gamma,0\right] \qquad (IC_1)$$

$$E\left[U^M|s,H,\gamma,\beta^*\right] \geq E\left[U^M|s,H,\gamma,\beta\right] \ \forall\ \beta \neq \beta^* \in B \qquad (IC_2)$$

Solving Program B produces the optimal compensation contract offered to the manager for which good news is rewarded, $s\left(g,\gamma\right) > s\left(b,\gamma\right)$.

Lemma 3: In the conditional influencing case, any compensation contract motivating $\theta^* = H$, has $s(g,\gamma) > s(b,\gamma)$.

From Lemma 3, if the BoD wants to induce high productive effort, it has to reward good news: $s(g,\gamma) > s(b,\gamma)$. Under such a contract, positive influencing fist-order stochastic dominates (FOSD) neutral and negative influencing.

Intuitively, the manager chooses positive influencing because it maximizes the likelihood of the highest-paying signal. In addition, the BoD cannot motivate the manager to supply neutral or negative influencing while ensuring high productive effort. In equilibrium then, the manager supplies high productive effort and positive influencing. The BoD, of course, is aware of the manager's influencing options and does not allow the manager to extract any rents.

Proposition 3: In the conditional influencing case, if $\theta^* = H$ is motivated, in equilibrium the manager supplies positive influencing, $\beta^* = \overline{\gamma}$, and the BoD cannot prevent the manager from influencing.

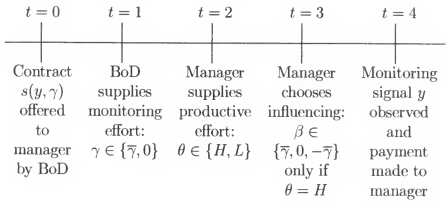

Figure 4–1: Conditional-influencing case time line

Furthermore, if influencing is conditional on high productive effort, negative influencing does not affect the manager's productive effort. This is because for $\beta^* = \overline{\gamma}$, the IC_2 constraints do not bind. Intuitively, negative influencing can be beneficial to the manager only in combination with low productive effort. However, since influencing is only available under high productive effort, negative influencing is of no use to the manager.

Positive influencing plays the role of added insurance to the manager. Intuitively, when the manager "behaves" by supplying high productive effort, positive influencing makes it more transparent for the BoD to "see" that he supplied high productive effort. The added insurance lowers the manager's risk

exposure, which in turn means smaller compensating wage differentials.[1] In equilibrium, the information system in the benchmark case is a garbling of the information system in the conditional influencing case. This implies the BoD is strictly better off in the conditional influencing case relative to the no-influencing case.[2]

Proposition 4: The BoD is strictly better off in the conditional influencing case relative to the benchmark case.

Our analysis suggests monitoring gains in the conditional influencing case are lower than monitoring gains in the benchmark case. From Lemma 2, the BoD faces decreasing returns to monitoring. Given that $\beta^* = \overline{\gamma}$ and positive influencing is a partial substitute for high monitoring intensity, the BoD's monitoring gains are lower relative to the Benchmark case (proof omitted). This also suggests the BoD either continues to supply the same level of monitoring as in the benchmark case, or decreases its monitoring intensity. Intuitively, positive influencing plays the role of free additional monitoring supplied by the manager and positive influencing makes monitoring less valuable for the BoD.

Corollary 1: If condition 3-5 holds, monitoring gains in the conditional influencing case are lower than monitoring gains in the benchmark case.

Moreover, it is easily verifiable that if the influencing option prompts the BoD to lower its monitoring, the resulting information system is a garbling of the information system with no-influencing and high monitoring. The reason is the BoD lowers its monitoring, but, positive influencing is only a partial substitute for

[1] The compensating wage differential is the difference between the manager's expected compensation and his certainty equivalent.

[2] This result depends heavily on our assumption that productivity is unaffected by influencing and that influencing carries no personal cost for the manager.

high monitoring. Positive influencing is a perfect substitute for high monitoring if positive influencing is the manager's optimal choice for both levels of productive effort, $\beta^* = \overline{\gamma} \; \forall \; \theta \in \Theta$. Intuitively, the improvement of informativeness from influencing does not outweigh the decrease in informativeness because of the lower monitoring.

Corollary 2: The information system in the conditional influencing case when the BoD lowers its monitoring intensity is less informative than the information system in the benchmark case with high monitoring.

For exposition, suppose influencing is contractible information. In this case, the BoD wants the manager to supply positive influencing. Conditional influencing benefits the BoD by lowering the required compensating wage differential, and potentially allows the BoD to lower its monitoring.

Returning to the numerical example, Table 4–1 shows results for the conditional influencing case for $\beta^* = \overline{\gamma}$ (any other influencing level is infeasible). The BoD's optimal monitoring intensity is low while socially optimal monitoring is high. Notice that the expected cost for $\alpha = 0.05$ and $\alpha = 1$ is lower than the equivalent cost in the benchmark case because of the risk reduction properties of positive influencing.

Table 4–1: Conditional influencing numerical example

	$\underline{\gamma} = 0$	$\overline{\gamma} = 0.01$
$s(g, \gamma)$	6553.84	5970.15
$s(b, \gamma)$	−2680.17	−2433.61
$\alpha E[s\|H, \gamma] + c(\gamma)$	152.25	155.04
$G(\alpha = 0.05)$	−2.79	
$E[s\|H, \gamma] + c(\gamma)$	3044.92	2872.76
$G(\alpha = 1)$	172.16	

Unconditional Influencing Case

We now extend our analysis to a case where the manager's influencing option is independent of his productive effort supply. This means the manager

can also influence in combination with low productive effort. Thus the BoD has to additionally ensure the manager does not find it best to put in low productive effort and influence. The BoD's optimization program in the unconditional influencing scenario simplifies to the following (Program C):[3]

$$\min_{s(y,\gamma),\gamma} \alpha E\left[s|H,\gamma,\overline{\gamma}\right] + c\left(\gamma\right)$$

$$s.t.$$

$$E\left[U^M|s,H,\gamma,\overline{\gamma}\right] \geq -1 \qquad (IR)$$

$$E\left[U^M|s,H,\gamma,\overline{\gamma}\right] \geq E\left[U^M|s,L,\gamma,-\overline{\gamma}\right] \qquad (IC)$$

Solving for the optimal compensation contract we find that if the BoD wants to motivate high productive effort it has to reward good news: $s(g,\gamma) > s(b,\gamma)$.

Lemma 4: In the unconditional influencing case, any compensation contract motivating $\theta^\star = H$, has $s(g,\gamma) > s(b,\gamma)$.

A contract that rewards good news, $s(g,\gamma) > s(b,\gamma)$, means several of the manager's strategies are strictly dominated. This follows immediately from the fact that with high productive effort, positive influencing FOSD neutral influencing which in turn FOSD negative influencing. Intuitively, when the manager supplies high productive effort, positive influencing follows because it maximizes the likelihood of the favorable signal "g." If however, the manager supplies low productive effort, negative influencing follows which also maximizes the likelihood of the "g" signal. With low productive effort, negative influencing FOSD neutral influencing which in turn FOSD positive influencing. In equilibrium, the manager supplies high productive effort and positive influencing. In addition, the BoD cannot motivate the manager to supply any other level of influencing besides positive influencing while ensuring high productive effort.

[3] See Appendix B for details.

Proposition 5: In the unconditional influencing case, if $\theta^* = H$ is motivated, the manager's optimal influencing level is positive, $\beta^* = \overline{\gamma}$.

The incentive compatibility constraint is binding, which means the optimal solution to Program C cannot result in smaller expected cost for the BoD. Even though in equilibrium the manager supplies high productive effort followed by positive influencing, the threat of low productive effort and negative influencing results in higher expected compensation cost.

Corollary 3: The BoD is better off under conditional rather than unconditional influencing.

The combination of high productive effort and positive influencing, as discussed in the conditional influencing case, is beneficial to both the shareholders and the BoD due to its "insurance-like" properties. Corollary 3 however, suggests negative influencing leads to higher expected compensation cost relative to the conditional influencing case. The effects of negative influencing are discussed in detail in the next section.

Suppose influencing is contractible information; in this case the BoD rewards positive influencing and imposes a severe penalty for negative influencing (e.g., $s(y, \gamma, \beta = -\overline{\gamma}) = -\infty$). The negative influencing option has the same impact on the information system as adding noise; consequently, the BoD ensures negative influencing is not a "realistic" option for the manager.

Returning to our numerical example, Table 4-2 shows results for the unconditional influencing case. The BoD's optimal monitoring choice is low, while high monitoring is socially optimal. Notice incremental monitoring gains to the BoD from high monitoring are lower than equivalent gains in the benchmark case (-1.48 compared to -1.20). Also, the expected compensation cost for the BoD and shareholders is higher than the associated cost in the conditional influencing case.

Table 4–2: Unconditional influencing numerical example

	$\gamma = 0$	$\overline{\gamma} = 0.01$
$s(g, \gamma)$	6819.51	6175.31
$s(b, \gamma)$	−2848.63	−2581.73
$\alpha E[s\|H, \gamma] + c(\gamma)$	157.28	158.76
$G(\alpha = 0.05)$	−1.48	
$E[s\|H, \gamma] + c(\gamma)$	3145.62	2947.21
$G(\alpha = 1)$	198.41	

Focus on Negative Influencing

Unconditional influencing does not allow us to clearly determine how the BoD responds to the manager's influencing options, and at the outset, the negative influencing option does not seem to be beneficial in any way. Accordingly, we now focus on negative influencing by examining a case where the manager can only choose between negative and neutral influencing. We refer to this case as the limited influencing case.

We find that incremental benefits from high monitoring are higher in the limited influencing case relative to the benchmark case. This suggests the negative influencing option makes monitoring more valuable to the BoD, and consequently, monitoring intensity in the limited influencing case is weakly higher than monitoring in the benchmark case.

The threat of negative influencing has the same effect as adding noise to the information system.[4] The IC constraint in the limited influencing case is binding: $E[U^M|s, H, \gamma, \beta = 0] = E[U^M|s, L, \gamma, \beta = -\overline{\gamma}]$.[5] Given decreasing returns to monitoring gains (Lemma 2), the BoD's monitoring gains are higher in the limited influencing case relative to the benchmark case. Intuitively, the threat of

[4] Of course, if influencing is contractible information, the BoD penalizes the manager if he influences.

[5] The analysis is similar to the proof of proposition 5 and is omitted.

using influencing to facilitate shirking makes monitoring more valuable to the BoD. This suggests the BoD's monitoring intensity is weakly higher than its monitoring intensity in the no-influencing case.

Corollary 4: In the limited influencing case, if condition 3-5 holds, the incremental benefit from high monitoring is higher than the equivalent benefit in the benchmark case, and the BoD's monitoring is weakly higher than its monitoring in the benchmark case.

A rational BoD preemptively responds to the manager's negative influencing option by increasing its monitoring intensity. The manager's option to negative influence makes supplying low productive effort more attractive to the manager. The BoD, of course, is aware of this and responds by increasing its monitoring to make this unwelcome combination less attractive to the manager. It is also important to note the manager does not, in equilibrium, supply negative influencing, so it is in fact the threat of negative influencing that induces the BoD to increase its monitoring.

Our analysis also shows that low monitoring imposes more risk on managers, which suggests low monitoring BoDs pay managers more to compensate them for "added" risk. This means high monitoring BoDs pay smaller compensating wage differentials.[6] It is important to note the manager is not better off under low monitoring, despite the expected higher pay, because the extra compensation is just enough to reward the manager for the added risk imposed on him. Intuitively, a manager who behaves by supplying high productive effort welcomes monitoring since it makes it more transparent for the BoD that he behaved.

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[6] High monitoring means lower expected compensation cost (see Proposition 1), and the manager receives his reservation utility (the BoD does not allow the manager to extract any rents).

Returning yet again to our running numerical example, Table 4–3 presents results for the limited influencing case. The BoD's optimal monitoring choice is indeed high which is also socially optimal. The negative influencing option induces the BoD to increase its monitoring relative to the benchmark case; high monitoring gains are positive. Also notice that the expected cost to the BoD is higher than the equivalent cost in the benchmark case, reflecting the fact negative influencing makes it more costly to motivate the manager. In addition, the equilibrium expected social cost for the limited scenario (3056.92), is actually lower than the equilibrium social expected cost for the benchmark case (3173.40), which means overall social-welfare gains.

Table 4–3: "Limited" influencing numerical example

	$\gamma = 0$	$\overline{\gamma} = 0.01$
$s(g)$	7296.29	6553.84
$s(b)$	−2965.98	−2680.17
$\alpha E[s\|H,\gamma] + c(\gamma)$	164.70	164.25
$G(\alpha = 0.05)$	0.45	
$E[s\|H,\gamma] + c(\gamma)$	3294.00	3056.92
$G(\alpha = 1)$	237.08	

General Discussion on Influencing

The general idea behind influencing is that a manager's behavior may affect the BoD's perception of the manager, and alter how the BoD interprets information related to the manager's performance. When the manager influences, the BoD interprets information more favorably for the manager. Influencing then, is as if affecting the distribution of information signals and is stylized as increasing the likelihood of good news. Intuitively, the manager gets more credit for good news and less blame for bad news. For example, good news is attributed more to the manager's skills and hard work, and bad news is attributed more to factors beyond the manager's control such as unexpected unfavorable economic conditions or unfavorable exchange rates. We are not concerned with how managers influence

the BoD and treat influencing as a black box; however, we are concerned with the overall impact of the manager's influencing option on the BoD's and manager's actions.

The driving force behind our results is the impact of influencing on informativeness. Depending on the characteristics of the influencing option, influencing leads to an increase or decrease in informativeness, in the sense of Blackwell. We have already established that conditional influencing leads to an increase in informativeness (refer to proof of Proposition 4), and it can be shown that limited influencing leads to a decrease in informativeness (proof similar to proof of Proposition 4 and omitted).

We now relax the symmetry assumption on influencing and allow positive influencing, denoted by β^+, and negative influencing, denoted by β^-, to freely vary.[7, 8] Ceteris paribus, positive influencing leads to lower compensating wage differentials as a partial substitute for high monitoring, and negative influencing leads to a higher compensating wage differential as it has the reverse effect of positive influencing.[9] Under some conditions and holding monitoring intensity fixed, influencing improves informativeness and leads to a lower compensating wage differential relative to the benchmark case.

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[7] Note influencing was symmetric in the sense $\beta \in \{-\overline{\gamma}, 0, \overline{\gamma}\}$.

[8] Naturally, extending conditions 3-2 and 3-3, we continue to assume

$$\exp(-rC) > \frac{1-\pi_H-\gamma-\beta^+}{1-\pi_L+\gamma+\beta^-}$$

and

$$1 > \pi_H + \overline{\gamma} + \beta^+ > \pi_L - \overline{\gamma} + \beta^- > 0$$

where $\beta^- < 0$.

[9] The latter follows from Corollary 4.

Proposition 6: Unconditional influencing leads to a lower compensating wage differential relative to the benchmark case if for monitoring intensity γ the following condition holds:

$$\beta^{+} > \max\left\{\frac{-\beta^{-}(\pi_H+\gamma)}{(\pi_L-\gamma)}, \frac{-\beta^{-}(1-\pi_H-\gamma)}{(1-\pi_L+\gamma)}\right\} \tag{4-1}$$

Holding monitoring intensity fixed, it is also easily verifiable that if

$$\beta^{-} < \min\left\{\frac{\beta^{+}(\gamma-\pi_L)}{(\pi_H+\gamma)}, \frac{\beta^{+}(-1+\pi_L-\gamma)}{(1-\pi_H-\gamma)}\right\} \tag{4-2}$$

unconditional influencing leads to a higher compensating wage differential relative to the benchmark case (proof similar to proof of Proposition 6 and omitted).

Moreover, if the characteristics of influencing are such that influencing leads to efficiency gains and monitoring exhibits decreasing returns to scale, the BoD does not increase its monitoring relative to the benchmark case. In other words, conditions 3-5 and 4-1 have to hold. The reason, again, is decreasing returns to monitoring (proof omitted).

Corollary 5: If conditions 3-5 and 4-1 hold, in equilibrium, the BoD does not increase its monitoring intensity relative to the benchmark case.

Intuitively, influencing results in a better information system relative to the benchmark case which means the BoD does not have to increase its monitoring. Likewise, if conditions 3-5 and 4-2 hold, the BoD does not decrease its monitoring relative to the benchmark case.

As before, suppose influencing is contractible information, but the BoD cannot distinguish between positive and negative influencing. If condition 4-1 holds, the BoD benefits from influencing and rewards it. Similarly, if condition 4-2 holds, the BoD prevents influencing by penalizing it.

Returning yet again to our numerical example, Table 4–4 presents the results when condition 4-1 holds and when condition 4-2 holds. For the case where condition 4-1 holds, the expected cost is lower for both monitoring levels relative to

the benchmark case. In contrast, when condition 4-2 holds, the benchmark case is less costly.

Table 4–4: General influencing numerical example

	Condition 4-1 *holds* $(\beta^+ = 0.02, \beta^- = -0.01)$		*Condition* 4-2 *holds* $(\beta^+ = 0.01, \beta^- = -0.08)$	
	$\gamma = 0$	$\overline{\gamma} = 0.01$	$\gamma = 0$	$\overline{\gamma} = 0.01$
$s(g, \gamma)$	6403.20	5839.29	10229.98	8575.42
$s(b, \gamma)$	−2740.27	−2490.30	−4497.86	−3991.07
$\alpha E[s\|H, \gamma] + c(\gamma)$	151.01	154.03	231.67	208.29
$G(\alpha = 0.05)$	−3.03		23.38	
$E[s\|H, \gamma] + c(\gamma)$	3020.11	2852.64	4633.40	3937.82
$G(\alpha = 1)$	167.48		695.58	

Social-Welfare

Our analysis has established that the manager's influencing option creates additional benefits and cost relative to the benchmark case. The impact of influencing on social-welfare depends on the individual characteristics of influencing as well as on the BoD's monitoring response to influencing. In assessing the effects of influencing on social-welfare we need to consider the joint effect of influencing and monitoring, and the cost of monitoring. Unfortunately, a detailed benefit-cost analysis is not possible due to the many factors affecting the associated gains and cost (e.g., risk aversion, ownership percentage, the probability structure, and the magnitude of influencing). Consequently, our social-welfare analysis is limited to a discussion on how influencing leads to social-welfare gains or losses.

In influencing cases where the BoD's equilibrium monitoring is the same as its equilibrium monitoring in the benchmark case, conditional influencing and unconditional influencing for which condition 4-1 holds lead to social-welfare gains. The characteristics of influencing are such that the resulting information system is more efficient than the equivalent information system in the benchmark case, and the BoD does not alter its monitoring behavior in a way that adversely affects the informativeness of the information system.

As discussed earlier, the characteristics of influencing can be such that in equilibrium the BoD reduces its monitoring. Notice that the BoD does not decrease its monitoring unless influencing substitutes for it, at least partially. This implies that in such cases, ceteris paribus, influencing leads to efficiency gains. Also, the decrease in monitoring means lower monitoring cost. On the other hand, lower monitoring leads to a less informative information system. If the influencing efficiency gains and lower monitoring cost offset the efficiency losses from the lower monitoring, influencing leads to overall social-welfare gains.

In cases where the BoD responds to influencing by increasing monitoring, and if monitoring efficiency gains offset influencing efficiency losses and higher monitoring cost, influencing leads to social-welfare gains. Also, even in cases where monitoring efficiency gains do not completely offset influencing efficiency losses, we may still have social-welfare gains. In cases where without influencing the BoD monitors less than what shareholders find optimal, higher monitoring prompted by influencing means that the conflict of interests between shareholders and BoD is alleviated. The overall impact on social-welfare depends on how much "value" shareholders place on the increased monitoring. To the extent that monitoring gains to shareholders are sufficiently "large" and outweigh any efficiency losses due to influencing and increased monitoring cost, influencing leads to social-welfare gains.[10]

Conclusions

Our results show that influencing, depending on its characteristics, may lead to a more or less efficient information system. In equilibrium, the manager

[10] The implicit assumption is that shareholders have no other means to motivate the BoD to increase its monitoring, or that influencing is less costly than other available mechanisms.

behaves by supplying high productive effort and positive influencing; however, the effects of the influencing option are more subtle. The off-equilibrium path of low productive effort and negative influencing plays a crucial role in the BoD's monitoring behavior. In cases where influencing can potentially lead to a less efficient information system, the BoD may preemptively respond by increasing monitoring relative to no-influencing cases. Even though in equilibrium the manager never supplies low productive effort and negative influencing, the threat of doing so induces the BoD to respond by increasing monitoring. This becomes more important in cases where BoDs' monitoring is less than what shareholders would have chosen, had they been making monitoring decisions. Higher monitoring prompted by influencing means agency costs between shareholders and BoD are alleviated. Depending on how much shareholders "value" higher monitoring, influencing may lead to social-welfare gains.

Our analysis also shows that conflicts of interests in organizations may be interconnected in not so obvious ways. The influencing option, and in particular the negative influencing option, creates a worse incentive problem between the BoD and manager. At the same time though, it may also lead to higher monitoring by the BoD, which means alleviated agency cost between BoD and shareholders. We show not only that the two agency cost sets are linked, but in some cases, depending on the severity of each set of agency cost, it may be optimal to create a worse incentive problem between BoD and manager, through influencing, to mitigate agency cost between shareholders and BoD.

CHAPTER 5
COSTLY INFLUENCING

Introduction

Our analysis in Chapter 4 was based on costless influencing. In this chapter, we continue our analysis by considering the effects of personally costly influencing for the manager. As before, we focus on the effects of influencing on the BoD's and manager's actions. In addition, we discuss the BoD's and shareholders' behavior in cases where they have control over the manager's cost of influencing.

We find that the manager's choice of influencing depends directly on his personal cost of influencing, and indirectly on the BoD's monitoring intensity. For sufficiently high influencing cost, the BoD can prevent the manager from influencing while ensuring high productive effort. Nevertheless, the BoD may encourage influencing, if the associated efficiency gains outweigh its cost. Higher monitoring can also prevent influencing by making it a less attractive option for the manager. For sufficiently low cost of influencing, the BoD cannot prevent influencing while ensuring high productive effort. Moreover, in some cases the BoD is better off when the manager does not influence; consequently, the BoD increases its monitoring intensity to prevent influencing. Importantly, higher monitoring alleviates the conflict of interests between the shareholders and the BoD, and can result in social welfare gains.

A particularly interesting cases arises when shareholders have control over the manager's personal cost of influencing, and want the BoD to increase its monitoring. Shareholders can make influencing more costly for the manager to "force" the BoD increase its monitoring. In such cases, the shareholders indirectly

make low monitoring more expensive for the BoD (and themselves). The added potential cost of influencing, in the event the BoD does not prevent the manager from influencing, prompts the BoD to increase its monitoring. Importantly, in such cases, the shareholders are not penalizing themselves by increasing the manager's personal cost of influencing, since in equilibrium the manager does not influence.

This chapter is organized as follows. We begin by presenting the necessary model modifications. The analysis on the effects of costly influencing follows. We then discuss the BoD's and shareholders' behavior in cases where they control the manager's cost of influencing. Finally, we offer conclusions.

Model Modifications

We expand the agency setting from Chapter 4 and assume influencing is personally costly for the manager. Let $c_{\theta,\beta}$ denotes the manager's personal cost for productive effort θ and influencing β. Without loss of generality, set $c_{\theta,0} = c(\theta)$ and $c_{\theta,\beta} = c(\theta) + C_\beta$ with $C_\beta > 0$ for $\beta \neq 0$. Accordingly, the manager's utility is: $U^M = -\exp\left[-r\left(s - c_{\theta,\beta}\right)\right]$. Also, for simplicity, influencing is symmetric: $\beta \in B \equiv \{-\overline{\gamma}, 0, \overline{\gamma}\}$.

Cost of influencing is not contractible explicitly, and the contract, as usual, is a function of the monitoring signal y and monitoring intensity γ, $s(y, \gamma)$. Finally, the noted structure of the game is common knowledge.

Influencing Analysis

Conditional Influencing Case

We begin our analysis by revisiting the conditional influencing case.[1] The BoD's objective, as before, is to maximize its benefit while ensuring high productive effort (Program B'). The combination of the IC_1 and IC_2 constraints ensures the manager supplies high productive effort followed by β^* influencing.

[1] Our benchmark is the same no-influencing case analyzed in Chapter 3.

$$\min_{s(y,\gamma),\gamma,\beta^{\star}} \alpha E\left[s|H,\gamma,\beta^{\star}\right] + c\left(\gamma\right)$$

$s.t.$

$$E\left[U^{M}|s,H,\gamma,\beta^{\star}\right] \geq -1 \qquad (IR)$$

$$E\left[U^{M}|s,H,\gamma,\beta^{\star}\right] \geq E\left[U^{M}|s,L,\gamma,0\right] \qquad (IC_1)$$

$$E\left[U^{M}|s,H,\gamma,\beta^{\star}\right] \geq E\left[U^{M}|s,H,\gamma,\beta\right] \ \forall\ \beta \neq \beta^{\star} \in B \qquad (IC_2)$$

Solving Program B' produces the optimal compensation contract; as usual, good news is rewarded: $s\left(g,\gamma\right) > s\left(b,\gamma\right)$.[2] Under a contract that rewards good news, supplying positive influencing strictly dominates supplying negative influencing. Positive and negative influencing entail the same personal cost for the manager; positive influencing however FOSD negative influencing. In equilibrium, the BoD ensures the manager supplies high productive effort followed by either positive or neutral influencing. As we later discuss, the manager's choice of influencing, in equilibrium, depends directly on his personal cost of influencing and indirectly on the BoD's monitoring.

From Proposition 3, positive influencing FOSD neutral influencing which in turn FOSD negative influencing. Also, for costless influencing the BoD could not prevent the manager from influencing while ensuring high productive effort. However, the manager's personal cost of influencing can deter him from influencing. For sufficiently high cost of influencing, the BoD can offer the manager the same contract as in the benchmark case, and the manager, in equilibrium, supplies high productive effort and no-influencing. Let $s^{*}_{\gamma,\beta=0}$ denote the benchmark case optimal contract for monitoring intensity γ.

Lemma 5: In the conditional influencing case with personally costly influencing, if high productive effort is motivated ($\theta^{*} = H$), for $s^{*}_{\gamma,\beta=0}$ the manager

[2] Proof similar to proof of Lemma 1 in Chapter 3.

does not influence ($\beta^* = 0$) if and only if the following condition holds

$$\exp(rC_\beta) > \frac{E\left[U^M | s^*_{\gamma,\beta=0}, H, \gamma, \beta = 0\right]}{\sum_y \pi(y|H,\gamma,\beta=\overline{\gamma})\left\{-\exp\left[-r\left(s^*_{\gamma,\beta=0} - C\right)\right]\right\}} \tag{5-1}$$

Lemma 5 describes a necessary and sufficient condition for the manager to influence. For sufficiently high personal cost of influencing, and a contract that is based on no-influencing, the manager does not have any incentives to influence. This implies that if condition 5-1 holds, contrary to the costless influencing case, the BoD can ensure high productive effort and no-influencing. Let $C'_{\beta,\gamma}$ denote the level of the manager's personal cost of influencing, at which under contract $s^*_{\gamma,\beta=0}$ he is indifferent between supplying high productive effort followed by either positive or neutral influencing.

It is important to note that if condition 5-1 does not hold, for any level of monitoring intensity, in equilibrium the manager supplies high productive effort followed by positive influencing. Furthermore, the BoD cannot prevent the manager from influencing. The BoD has to reward good news to ensure high productive effort, and influencing allows the manager to increase the likelihood of good news, at a low cost. Intuitively, if the manager's personal cost is too low, the contract that motivates high productive effort is simply too attractive to forgo influencing.[3]

Proposition 7: In the conditional influencing case with personally costly influencing, if $\theta^* = H$ is motivated and condition 5-1 does not hold $\forall\ \gamma \in \Gamma$, in equilibrium the manager supplies positive influencing, $\beta^* = \overline{\gamma}$, and the BoD cannot prevent the manager from influencing.

The BoD, of course, can infer the manager's equilibrium behavior and does not allow him to extract any rents. This means that when in equilibrium

[3] As we later show, the BoD's monitoring intensity plays an important role on the manager's influencing behavior.

the manager influences, $\theta^* = H$ and $\beta^* = \overline{\gamma}$, he receives his reservation utility. This in turn implies that the manager is compensated for his personal cost of influencing, and indirectly the BoD incurs part of this cost. In cases where the manager influences, the BoD benefits because of the risk-reduction properties of influencing; nevertheless, it also incurs part of the manager's personal cost for influencing.[4] This implies that, depending on the manager's personal cost of influencing, the BoD may be better off under no-influencing. Let $C''_{\beta,\gamma}$ denote the manager's personal cost of influencing for which influencing efficiency gains are zero. This means that if $\beta^* = \overline{\gamma}$ and $C''_{\beta,\gamma} < C_\beta < C'_{\beta,\gamma}$ the BoD is worse off relative to the benchmark case (proof omitted).

Corollary 6: In the unconditional influencing case with personally costly influencing, if in equilibrium $\beta^* = \overline{\gamma}$ and $C''_{\beta,\gamma} < C_\beta < C'_{\beta,\gamma}$ the BoD is worse off relative to the benchmark case.

Intuitively, in some cases, the BoD has to "tolerate" influencing to ensure high productive effort. The manager's personal cost of influencing is sufficiently low so that the BoD cannot prevent influencing, while ensuring high productive effort. The BoD extracts all rents, but influencing is sufficiently costly that the BoD is worse off relative to the no-influencing case.

The BoD may also encourage influencing. If $C'_{\beta,\gamma} < C_\beta < C''_{\beta,\gamma}$, the BoD can ensure high productive effort and no influencing; however, influencing improves informativeness and leads to overall efficiency gains. Thus, the BoD is better off with influencing and encourages it (proof omitted). Intuitively, the increase in informativeness is too valuable to the BoD to prevent the manager from influencing.

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[4] From Proposition 3, conditional influencing improves informativeness and leads to a lower compensating wage differential.

Corollary 7: In the unconditional influencing case with personally costly influencing, if $C'_{\beta,\gamma} < C_\beta < C''_{\beta,\gamma}$, the BoD is better off with influencing and encourages it.

Furthermore, monitoring affects the manager's choice of influencing. Technically, $C'_{\beta,\gamma}$ is smaller for high monitoring intensity. Holding C_β fixed, increasing monitoring can allow the BoD to ensure that, in equilibrium, the manager supplies high productive effort and no-influencing. Intuitively, higher monitoring makes influencing a less attractive option for the manager.

Proposition 8: In the conditional influencing case with personally costly influencing, higher monitoring lowers the personal cost influencing threshold over which no-influencing is feasible

$$C'_{\beta,\gamma=\overline{\gamma}} < C'_{\beta,\gamma=0} \tag{5-2}$$

Proposition 8 states that higher monitoring can make no-influencing feasible, while allowing the BoD to ensure high productive effort. This is important in cases where the BoD is worse off when the manager has the option to influence, relative to the benchmark case. If the BoD wants to prevent influencing, increasing monitoring is the only available means. As we discuss later, in the event shareholders control the manager's cost of influencing, by making influencing more expensive for the manager, they can potentially "force" the BoD to increase its monitoring.

Returning to the running numerical example, Table 5–1 shows numerical results for two levels of influencing cost to the manager, $C_\beta \in \{10, 100\}$. For $C_\beta = 10$, the cost of influencing is sufficiently low so the efficiency gains of positive influencing outweigh its cost. The BoD, in equilibrium, supplies low monitoring while high monitoring is socially optimal. Also, both the shareholders and the BoD are better off relative to the benchmark case. For $C_\beta = 100$, influencing is

sufficiently costly that under low monitoring and positive influencing, both the shareholders and the BoD are worse off relative to the benchmark case. The higher cost of influencing indirectly makes low monitoring more expensive for the BoD. Consequently, the BoD is "forced" to increase its monitoring to prevent influencing. So, in equilibrium, the BoD supplies high monitoring intensity while the manager does not influence. This implies the shareholders and BoD are as well off as in the benchmark case, when the BoD supplies high monitoring. Most important, under the higher cost of influencing, $C_\beta = 100$, the conflict of interests between the BoD and shareholders is resolved.

Table 5–1: Personally costly conditional influencing numerical example

	$C_\beta = 10$		$C_\beta = 100$	
	$\underline{\gamma} = 0$	$\overline{\gamma} = 0.01$	$\underline{\gamma} = 0$	$\overline{\gamma} = 0.01$
	$\beta^\star = 0.01$	$\beta^\star = 0.01$	$\beta^\star = 0.01$	$\beta^\star = 0$
$s(g,\gamma)$	6595.73	6007.09	6978.85	6316.36
$s(b,\gamma)$	−2690.78	−2443.36	−2785.28	−2523.21
$\alpha E[s\|H,\gamma] + c(\gamma)$	153.34	156.02	163.42	159.87
$G(\alpha = 0.05)$	−2.68		3.55	
$E[s\|H,\gamma] + c(\gamma)$	3066.86	2892.42	3268.48	2969.32
$G(\alpha = 1)$	174.44		299.16	

Unconditional Influencing Case

In the unconditional influencing case, the BoD's optimization program is the following (Program C'):

$$\min_{s(y,\gamma),\gamma} \alpha E[s|H,\gamma,\beta^\star] + c(\gamma)$$

s.t.

$$E\left[U^M|s,H,\gamma,\beta^\star\right] \geq -1 \qquad (IR)$$

$$E\left[U^M|s,H,\gamma,\beta^\star\right] \geq E\left[U^M|s,L,\gamma,\beta_1^\star\right] \qquad (IC)$$

where $\beta_1^\star \in B$ is the manager's optimal influencing choice following low productive effort. The IR ensures the manager participates in the game and the IC ensures the manager supplies high productive effort followed by $\beta^\star$ influencing. As usual,

good news must be rewarded to ensure high productive effort, $s(g,\gamma) > s(b,\gamma)$.[5] Furthermore, the manager's undominated strategies are high productive effort followed by either positive or neutral influencing, and low productive effort followed by either negative or neutral influencing.[6]

The manager's personal cost of influencing makes low productive effort and negative influencing a less attractive option. In fact, if condition 5-1 holds, the manager's best off-equilibrium alternative is low productive effort and no-influencing. Intuitively, if the manager does not have any incentives to influence following high productive effort, he has no incentives to influence following low productive effort.

Corollary 8: In the unconditional influencing case with personally costly influencing, if high productive effort is motivated ($\theta^* = H$) and condition 5-1 holds, the manager's best off-equilibrium alternative is low productive effort followed by neutral influencing. Consequently, the unconditional influencing case is identical to the conditional influencing case.

Returning to the numerical example, Table 5-2 shows numerical results for the two levels of influencing cost to the manager, $C_\beta \in \{10, 100\}$. For $C_\beta = 10$, the cost of influencing is sufficiently low so the best off-equilibrium alternative for the manager is low productive effort followed by negative influencing. For $C_\beta = 100$, the cost of influencing is sufficiently large so the manager's best off-equilibrium alternative is low productive effort and neutral influencing. The shareholders and BoD are as well off as in the benchmark case with high monitoring, and importantly, the conflict of interests between the BoD and shareholders is resolved.

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[5] Proof similar to proof of Lemma 1 in Chapter 3.

[6] Following high (low) productive effort, positive (negative) influencing FOSD negative (positive) influencing.

Table 5–2: Personally costly unconditional influencing numerical example

	$C_\beta = 10$		$C_\beta = 100$	
	$\underline{\gamma} = 0$	$\overline{\gamma} = 0.01$	$\underline{\gamma} = 0$	$\overline{\gamma} = 0.01$
	$\beta^* = 0.01$	$\beta^* = 0.01$	$\beta^* = 0.01$	$\beta^* = 0$
$s(g, \gamma)$	6829.51	6185.31	6978.85	6316.36
$s(b, \gamma)$	−2838.63	−2571.73	−2785.28	−2523.21
$\alpha E[s\|H, \gamma] + c(\gamma)$	157.78	159.26	163.42	159.87
$G(\alpha = 0.05)$	−1.48		3.55	
$E[s\|H, \gamma] + c(\gamma)$	3155.62	2957.21	3268.48	2969.32
$G(\alpha = 1)$	198.41		299.16	

Shareholders and BoD Control Cost of Influencing

The analysis in the previous section reveals that influencing cost affects equilibrium behavior. In this section we discuss potential implications of allowing the BoD or shareholders to affect the manager's personal cost of influencing.

Let us first consider the case where the BoD can make the manager's influencing cost higher or lower. In the conditional influencing case, the BoD would like to make influencing less expensive for the manager. The reason is influencing is a partial substitute for monitoring, so the BoD would like the manager to supply positive influencing. Furthermore, if in equilibrium the manager influences, the BoD has to compensate the manager for his personal cost of influencing, so it would like this cost to be as low as possible. In the unconditional influencing case, the BoD's decision depends on whether influencing leads to overall efficiency gains or not. If influencing leads to efficiency gains, the BoD would give the manager incentives to influence by lowering his personal cost of influencing.

A more interesting case arises when shareholders have the ability to affect the manager's personal cost of influencing. We have to distinguish between cases with and without a conflict of interests between the shareholders and the BoD. If there is no conflict, the shareholders would set influencing cost the same way the BoD would. If, however, there is conflict, the shareholders may want to make influencing more costly for the manager, to "force" the BoD to increase

its monitoring intensity. Increasing the manager's cost of influencing, indirectly increases the BoD's cost. As a result, the BoD may be better off if the manager does not influence; however, the only way the BoD can prevent the manager from influencing is by increasing its monitoring (proof omitted).

Corollary 9: If $C''_{\beta,\gamma} < C_\beta < C'_{\beta,\gamma}$, shareholders may want to make influencing more expensive for the manager to prompt the BoD to increase its monitoring and prevent the manager from influencing.

For exposition, suppose influencing is contractible information. In this case, if $C_\beta < C''_{\beta,\gamma}$ the BoD wants the manager to supply positive influencing and encourages it. If $C_\beta > C''_{\beta,\gamma}$ the BoD prevents the manager from influencing by penalizing it.

As before, the inherent conflict of interests between the BoD and shareholders ($\alpha < 1$), means that the BoD monitors weakly less than what shareholders would find optimal. Influencing however, can provide the BoD with added incentives to increase its monitoring, thus alleviating the conflict. In addition, for costly influencing, the BoD may want to prevent influencing. The model is set up so monitoring makes influencing less attractive for the manager. Thus the BoD can prevent influencing while ensuring high productive effort, by increasing its monitoring. The increase in monitoring can potentially result in social welfare gains by alleviating the conflict between the BoD and shareholders.

Conclusions

The manager's cost to influence adds another dimension to our analysis. In the analysis in Chapter 4, for costless influencing, the manager would always influence. Now, with costly influencing the manager has to take into consideration the associated cost. We find that higher monitoring makes influencing less attractive for the manager. This implies the BoD's monitoring choice indirectly affects the manager's decision to influence; the BoD can prevent influencing by

increasing its monitoring. Higher monitoring also resolves the conflict of interests between the shareholders and the BoD, and can result in social welfare gains. In addition, if shareholders have control over the manager's influencing cost, they may have incentives to make it more costly for the manager to influence, to "force" the BoD increase its monitoring.

CHAPTER 6
PRODUCTIVITY COST OF INFLUENCING

Introduction

Milgrom (1988) analyzed influencing using a model in which the employees allocate their limited time between productive and influencing activities. In this chapter we adopt Milgrom's notion of costly influencing; influencing takes time and effort that would have otherwise been used in productive activities. In other words, influencing makes the manager less productive. In addition, we allow for multiple sources of information, some of which are not subject to influencing. In particular, the BoD and manager can now contract on firm output, in addition to the accounting report, where output is the "untainted" information signal.

The purity of the output signal allows the BoD to ensure high productive effort and no-influencing. Influencing also leads to a decrease in informativeness of the output signal. However, the overall impact of influencing on informativeness remains an open question. We discuss the BoD's and manager's potential behavior and offer numerical examples.

This chapter is organized as follows. We begin by discussing the required model modification. We then analyze the effects of influencing, and offer conclusions.

Model Modifications

The manager's productive effort stochastically results in firm output. Firm output is binary, $x \in \{\underline{x}, \overline{x}\}$, and without loss of generality normalize $\underline{x} = 0$ and $\overline{x} > \underline{x} = 0$. The relationship between the manager's productive effort and firm output is given by the output probabilities, parameterized by the manager's effort

supply: $\pi(\overline{x}|H) = \kappa_H$ and $\pi(\underline{x}|L) = \kappa_L$ with $1 > \kappa_H > \kappa_L > 0$ and $\kappa_H > \frac{1}{2}$. Firm output is contemporaneously observed with the monitoring signal at $t = 4$ and there is no private information.

Influencing impacts the manager's productivity by diverting time and effort away from productive activities. The decrease in productivity is stylized as reducing the likelihood of high firm output by $\delta > 0$: $\pi(\overline{x}|H, \beta) = \kappa_H - \delta$ and $\pi(\overline{x}|L, \beta) = \kappa_L - \delta$. The effects of influencing on productivity are illustrated in Table 6–1.

Table 6–1: Influencing impact on productivity

	Firm Output x	
	$\overline{x}$	$\underline{x}$
$\pi(x\|H, \beta)$	$\kappa_H - \delta$	$1 - \kappa_H + \delta$
$\pi(x\|L, \beta)$	$\kappa_L - \delta$	$1 - \kappa_L + \delta$

Given the assumed structure of the model, the productivity cost of influencing is equal to $\delta \cdot \overline{x}$.[1] Also, the following condition holds regardless of δ:

$$\kappa_H - \delta > \kappa_L - \delta > 0 \tag{6-1}$$

as well as an additional technical requirement

$$\exp(-rC) > \frac{1 - \kappa_H}{1 - \kappa_L} \tag{6-2}$$

Condition 6-1 is to maintain consistent labeling, and 6-2 guarantees incentive compatibility constraints are feasible.[2]

Also, for convenience assume the output and monitoring signals are conditionally independent:

$$\pi(x, y|\theta, \gamma, \beta) = \pi(x|\theta, \beta) \cdot \pi(y|\theta, \gamma, \beta) \tag{6-3}$$

[1] Note that $\underline{x}$ is normalized to zero and the BoD wants high productive effort.

[2] Condition 3-3 or 6-2 is sufficient to guarantee the incentive compatibility constraints are feasible.

The magnitudes of positive and negative influencing, denoted by β^+ and β^- respectively, can freely vary. Of course, we continue to assume incentive compatibility constraints are feasible:

$$\exp(-rC) > \frac{1-\pi_H-\gamma-\beta^+}{1-\pi_L+\gamma+\beta^-} \tag{6-4}$$

The contract offered to the manager is a function of the observable signals x and y, and monitoring intensity γ, $s(x,y,\gamma)$. Finally, as usual, the noted structure of the game is common knowledge.

Influencing Analysis

We analyze the BoD's and manager's behavior by focusing on the conditional influencing case; extending the analysis to the unconditional case produces qualitatively similar results. For $\delta = 0$, the analysis and results are analogous to the conditional influencing case analyzed in Chapter 4. Accordingly, we focus on how the BoD's and manager's actions are affected by $\delta > 0$.

The BoD's objective is to maximize its personal benefit while ensuring high productive effort. The IR ensures the manager participates in the game, and the combination of the IC_1 and IC_2 constraints ensures high productive effort followed by β^* influencing. The BoD's optimization program is the following (Program D):

$$\max_{s(x,y,\gamma),\gamma,\beta^*} \alpha E[(x-s)|H,\gamma] - c(\gamma)$$

$s.t.$

$$E\left[U^M|s,H,\gamma,\beta^*\right] \geq -1 \tag{IR}$$

$$E\left[U^M|s,H,\gamma,\beta^*\right] \geq E\left[U^M|s,L,\gamma,0\right] \tag{IC_1}$$

$$E\left[U^M|s,H,\gamma,\beta^*\right] \geq E\left[U^M|s,H,\gamma,\beta\right] \ \forall\ \beta \neq \beta^* \in B \tag{IC_2}$$

From Proposition 3, in a costless influencing setting where all information are subject to influencing, the BoD cannot prevent the manager from influencing while ensuring high productive effort. However, the availability of information that is not subject to influencing means the BoD can ensure high productive

effort and no-influencing. The BoD can prevent influencing by making the manager's compensation more sensitive to output. This result relies heavily on our assumption that firm output is "pure," in the sense the manager cannot influence the BoD's beliefs about it.

Proposition 9: In the conditional influencing case with productivity cost of influencing, the BoD can ensure high productive effort and no-influencing.

The productivity cost of influencing can also deter the manager from influencing. For sufficiently high δ, the BoD can offer the manager the same contract as in the benchmark case and ensure high productive effort and no-influencing. Notice influencing increases the likelihood of good news and decreases the likelihood of high output. If high firm output is rewarded, β^{+} has to be sufficiently larger than δ for the manager to influence (proof omitted). Let $\delta^{'}$ denote the productivity cost of influencing level at which, under $s^{*}_{\gamma,\beta=0}$, the manager is indifferent between influencing and no-influencing, where $s^{*}_{\gamma,\beta=0}$ is the no-influencing contract for monitoring intensity γ.

Proposition 10: In the conditional influencing case with productivity cost of influencing, if $\delta > \delta^{'}$, the BoD can ensure high productive effort and no-influencing while actively using all information.

In addition, the analysis in Chapter 4 shows that conditional influencing leads to efficiency gains, but this is not necessarily true when influencing impacts productivity. Influencing affects the distributions, and informativeness, of both the monitoring signal and output. Ceteris paribus, influencing leads to a decrease in informativeness of the output signal.

Proposition 11: In the conditional influencing case with productivity cost of influencing, ceteris paribus, influencing leads to a decrease in informativeness of the output signal.

At the same time, from the proof of Proposition 4 in Chapter 4, ceteris paribus, conditional influencing leads to an increase in informativeness of the monitoring signal. When the contract includes both signals, the joint effect on informativeness is not clear. Unfortunately, the joint effect of influencing on the overall informativeness of the information system remains an open question. Consequently, the remaining of the chapter is a discussion of the BoD's and manager's potential behavior along with numerical examples.

When influencing leads to an overall increase of informativeness, the BoD must still consider the productivity cost of influencing, $\delta \cdot \overline{x}$, to decide whether to allow or prevent influencing. If influencing leads to overall efficiency gains, the BoD encourages influencing so, in equilibrium, the manager supplies high productive effort followed by positive influencing. The BoD's behavior is qualitatively similar to its behavior analyzed in the conditional influencing case in Chapter 4. Recall that the BoD monitors weakly less than what shareholders find optimal, and positive influencing serves as a partial substitute for high monitoring, which may prompt the BoD to decrease its monitoring relative to no-influencing cases.

Returning to our running numerical example, Table 6–2 shows the additional parameter values for the influencing case with productivity cost of influencing, and Table 6–3 shows the numerical results for the no-influencing and conditional influencing cases. For the conditional influencing case, the productivity cost of influencing is sufficiently low that in equilibrium the BoD motivates the manager to influence. Also, both the BoD and shareholders are better off relative to the benchmark case.

If influencing leads to efficiency losses, the BoD decides between "tolerating" and preventing influencing. The BoD may "tolerate" influencing despite efficiency losses for two reasons. First, preventing influencing forces the BoD to use the monitoring signal as an information source on whether influencing took place. In

other words, if the BoD wants to prevent influencing it should not reward good news. Notice that the monitoring signal is informative of the manager's productive effort and influencing. The likelihood that the manager influences is higher when good news is realized relative to bad news. If the BoD "tolerates" influencing, it can use the monitoring signal as an information source on the manager's productive effort. In other words, if the BoD wants to prevent the manager from influencing it has to use the monitoring signal less aggressively. Second, conditional influencing is a partial substitute for high monitoring; influencing can allow the BoD to decrease its monitoring.

Table 6–2: Additional parameter values for numerical examples

Parameter	Description	Value
$\overline{x}$	High firm output	5000
$\overline{\gamma}$	High monitoring intensity	0.03
δ	Productivity cost of influencing	$\{0.003, 0.03, 0.06\}$
$c(\overline{\gamma})$	High monitoring cost	3
$\pi(\text{"}g\text{"}\|H)$	Probability of signal "g" given H	0.70
$\pi(\text{"}g\text{"}\|L)$	Probability of signal "g" given L	0.40
$\pi(\overline{x}\|H)$	Probability of $\overline{x}$ output given H	0.70
$\pi(\underline{x}\|L)$	Probability of $\underline{x}$ output given L	0.40

Table 6–3: No-influencing and conditional influencing numerical example

	Benchmark: *no − influencing*		*Conditional Influencing*	
	$\delta = 0$, $\beta = 0$		$\delta = 0.003$, $\beta^* = \overline{\gamma}$	
	$\gamma = 0$	$\overline{\gamma} = 0.03$	$\gamma = 0$	$\overline{\gamma} = 0.03$
$s(\overline{x}, g, \gamma)$	3226.77	2991.95	3081.15	2862.43
$s(\overline{x}, b, \gamma)$	2113.91	1873.96	1931.88	1723.67
$s(\underline{x}, g, \gamma)$	2113.90	2229.82	2170.23	2243.11
$s(\underline{x}, b, \gamma)$	−3196.39	−2870.96	−3111.74	−2784.06
$\alpha E[(x-s)\|H, \gamma] - c(\gamma)$	65.94	65.06	66.41	65.31
$G(\alpha = 0.05)$	−0.88		−1.10	
$E[(x-s)\|H, \gamma] - c(\gamma)$	1318.72	1358.15	1328.26	1363.29
$G(\alpha = 1)$	39.43		35.03	

If the BoD "tolerates" influencing, it offers a contract so in equilibrium the manager supplies high productive effort and positive influencing. Also, the

BoD's behavior is qualitatively similar to its behavior analyzed in the conditional influencing case in Chapter 4.

On the other hand, if influencing decreases informativeness and the productivity cost of influencing is sufficiently high, the BoD prevents the manager from influencing. The BoD can achieve this by making the contract more sensitive to output, and perhaps using the monitoring signal as an information source on the manager's influencing behavior. If the BoD wants no-influencing, it might also have incentives to increase its monitoring intensity to make influencing less attractive for the manager. In addition, the BoD can prevent influencing by making the contract more sensitive to output. At the extreme, the BoD may ignore the accounting report. The downside, of course, is that the accounting report is informative about the manager's productive effort supply.

Depending on whether the BoD wants the manager to influence, the accounting report can be used in different contexts. If the BoD wants the manager to influence, it rewards good news, thus motivating influencing. On the other hand, if the BoD wants to prevent influencing, it weakly rewards bad news.

Returning to the numerical example Table 6–4 shows results for the conditional influencing case for $\delta = 0.03$ and $\delta = 0.06$. For $\delta = 0.03$ the productivity cost of influencing is sufficiently small, and the benefits of using the added information signal are sufficiently large that the BoD wants the manager to influence. For $\delta = 0.06$ the productivity cost of influencing is sufficiently large that the BoD does not allow the manager to influence. Also, the BoD increases its monitoring to make influencing less attractive for the manager. Notice that for $\delta = 0.06$ the BoD rewards bad news, "b". Bad news is an indicator of no-influencing and at the same time, rewarding good news gives incentives to the manager to influence.

Table 6–4: Conditional influencing with productivity cost numerical example

	Conditional Influencing		*Conditional Influencing*	
	$\delta = 0.03$, $\beta^* = \overline{\gamma}$		$\delta = 0.06$, $\beta^* = 0$	
	$\gamma = 0$	$\overline{\gamma} = 0.03$	$\gamma = 0$	$\overline{\gamma} = 0.03$
$s(\overline{x}, g, \gamma)$	3204.07	2952.27	3600.72	3058.94
$s(\overline{x}, b, \gamma)$	1848.17	1621.79	5152.49	5459.06
$s(\underline{x}, g, \gamma)$	2317.06	2354.56	−964.99	−106.28
$s(\underline{x}, b, \gamma)$	−3164.29	−2799.83	−2891.42	−3201.71
$\alpha E[(x-s)\|H, \gamma] - c(\gamma)$	58.62	57.86	55.82	56.39
$G(\alpha = 0.05)$	−0.76		0.57	
$E[(x-s)\|H, \gamma] - c(\gamma)$	1172.31	1214.14	1116.50	1184.73
$G(\alpha = 1)$	41.83		68.23	

Conclusions

BoDs have multiple sources of information at their disposal. Accordingly, in this chapter we explore a setting where the contract can be a function of two information signals, one of which cannot be influenced by the manager. Furthermore, influencing impacts productivity in the sense that when the manager exercises his influencing option, he uses time and effort that is otherwise used in productive activities. In this setting, the BoD can prevent the manager from influencing. This relies on the "purity" of firm output relative to the monitoring signal. The effects of influencing on informativeness are not clear. Influencing makes the output signal less informativeness but it also makes the monitoring signal more informative. As a result, the overall effects of influencing on informativeness and the BoD's and manager's behavior in equilibrium are open questions.

CHAPTER 7
CONCLUSIONS

Recent corporate-governance failures led to questioning the effectiveness of BoDs as corporate-governance mechanisms. Is the BoD the perfect solution to agency costs stemming from the separation of ownership and control? Probably not, but the BoD is a mechanisms that has evolved over the years and importantly, it is the market solution. If BoDs were ineffective, the market would have done away with them and replaced them with a more efficient mechanism.

One of the major concerns is lack of independence between the BoD and management. In short, an independent BoD's actions and decisions must reflect the shareholder's best interest. By definition, management cannot, and should not, affect these actions and decisions in any way. We believe that there are no independent BoDs, at least no independent BoDs whose interests are perfectly aligned to shareholders. The reality is that a BoD is an agent of shareholders. Every director on the board receives some benefit, both tangible and intangible (e.g., social status and prestige); their actions reflect their own best interests, which leads to additional agency costs. Concerns have been raised over the power exercised by managers on BoDs. Although managers are hired by BoDs, empirical and anecdotal evidence suggest managers are able to affect the decision-making process of BoDs. Our study addresses this issue by focusing on a unique aspect of the relationship and interactions of the BoD and management. The BoD makes decisions that affect the managers' welfare; as a result, the managers may spend time and effort trying to affect these decisions by altering how the BoD interprets information related to their performance. Influencing can be the result of inevitable

personal interactions between the manager and the BoD, or affecting the "quality" of information reaching the BoD. Significantly, with influencing the BoD interprets information more in favor of management.

The purpose of our study is to formally examine the effects of managerial influencing on the effectiveness of BoDs as corporate-governance mechanisms, and at the same time enhance our understanding of the interactions between the BoD and management. In particular, we explore how influencing affects the BoDs' monitoring and compensating decisions, and discuss its social-welfare implications. We build mainly on the works of Milgrom (1988) and Hermalin and Weisbach (1998) and analyze influencing in a corporate-governance setting. Our analysis includes cases with costless influencing, cases with influencing that is personally costly for the manager, and cases with multiple sources of information and influencing that impacts the manager's productivity.

In cases where influencing is costless, we show that influencing, depending on its characteristics, can result in efficiency gains. The BoD is aware of the manager's influencing options and ensures he does not extract any rents. Influencing can aggravate the severity of the conflict of interests between BoDs and management, by making low productive effort a more attractive option for the manager. Our analysis shows that in such cases, the BoD preemptively increases its monitoring. With influencing, monitoring becomes more valuable to the BoD. The BoD cannot directly prevent the manager from influencing; nevertheless, it ensures that he supplies high productive effort and does not extract any rents. The effects of influencing are more subtle in the sense that it is the threat of influencing that prompts the BoD to increase its monitoring.

We also explore cases where influencing is personally costly for the manager. We find the manager's choice of influencing depends directly on his personal cost of influencing, and most importantly, it depends indirectly on the BoD's monitoring

intensity. Higher monitoring makes influencing less attractive for the manager, and in some cases prevents influencing. Despite the fact the BoD does not allow the manager to extract rents, influencing can be damaging for the BoD. In such cases, the BoD can prevent the manager from influencing by increasing its monitoring.

Finally, we explore a setting where influencing impacts the manager's productivity. We also allow for two sources of information, one of which is not subject to influencing. In this setting, the BoD can prevent the manager from influencing by using the "untainted" information more aggressively. The BoD has to balance the potential efficiency gains from influencing and its productivity cost. Nevertheless, the overall impact of influencing on informativeness, or the BoD's and manager's equilibrium behavior, remain open questions.

Our model is set up with an inherit conflict of interests between the BoD and shareholders. Influencing can aggravate or alleviate this conflict. Our analysis shows that influencing can prompt higher or lower monitoring. When the BoD responds to influencing by increasing monitoring, the conflict is alleviated which in turn can result in social-welfare gains. This depends, of course, on how much shareholders "value" the added monitoring. It is important to note that without influencing, the BoD's monitoring can be lower than the socially optimal level. On the other hand, when influencing leads to improvements in informativeness, the BoD can substitute monitoring for influencing. This however, may aggravate the conflict between shareholders and BoD, and lead to social welfare losses.

We also find that the "quality" of a BoD plays an important role on the "size" of executive compensation. Low-monitoring BoDs pay the manager more, because they impose more risk on the manager. When the manager supplies high productive effort, he wants the BoD to know about it, and he wants to be compensated for it. Monitoring makes it more transparent to the BoD to see the managers effort supply, thus lowering his risk exposure.

We agree with Bebchuk and Fried (2004) assessment that shareholders and market power are relatively "weak" disciplinary mechanisms. However, we disagree with their estimate that the BoD is an ineffective corporate governance mechanism. They view "excessive" compensation as evidence of the manager's influencing the BoD to extract rents. However, our analysis suggests higher compensation is required to prevent the manager from using influencing to facilitate low productive effort, and the BoD does not allow the manager to extract any rents. Directors are usually prominent members of our society, wealthy, and successful. We do not believe they would ever allow themselves to become "pawns" and surrender complete control to the manager.

This research can be extended in several directions. We treat shareholders as passive participants in both the monitoring process, as well as in choosing the BoD. Proposed SEC rules could provide shareholders the right to nominate directors in cases where the company seems "unresponsive" to shareholders concerns conveyed through their voting. Shareholders can potentially play an important disciplining mechanism for both management and BoDs. Moreover, an important assumption in our paper is that the BoD can exogenously and costlessly commit to supplying monitoring as specified in the compensation contract. Relaxing this assumption would result in double moral hazard, where the BoD would have incentives to misreport its monitoring intensity. Of course, analyzing the effects of influencing with multiple sources of information and productivity cost is another possible future research direction.

We also acknowledge other disciplinary mechanisms such as takeovers, litigation, and monitoring by debt-holders. Nevertheless, we chose to ignore them to concentrate on the effects of influencing. Moreover, we view the BoD as a corporate-governance mechanism whose main role is to monitor management; we acknowledge potentially other functions such as strategic planning and consulting,

but we consider them of secondary importance. We must also acknowledge the fact that a BoD's decision-making process is complex. Directors have to appease shareholders, management and other stakeholders. They also have career concerns, face a challenging business environment, and may be subject to litigation. Researchers have examined what factors affect the decisions and actions of the BoD; nevertheless, the complexity of these decisions is, typically, often ignored or diluted. Admittedly, this issue has not been addressed in our study, but it is important to recognize directors may have varying and in many cases conflicting interests.

Our literature review reveals an important limitations of empirical research on BoDs: endogeneity. Existing literature treats the actions and characteristics of both the BoD and management as exogenously determined. Our analysis shows that the BoD's actions, its characteristics, and firm performance are endogenously determined. In fact, our analysis shows that the BoD's actions may be a function of the manager's set of possible actions, not just his observable actions; this, of course, complicates any empirical analysis. In addition, current research is limited to the appearance of independence. Likewise, rules and regulation also address the appearance of independence. For example, requiring outsiders on the audit-committee is seen as a way to ensure independence. This is a direct result of our inability to observe and measure the "actual" independence. Consequently, our research employs crude proxies (e.g., the percentage of outsiders, the number of meeting, and the experience of directors). The fact however remains that what we observe is the outcome of some decision process taking place behind closed doors, and we have no way of knowing if a BoD protects shareholders. Unfortunately, we learn of "weak" or bad" BoDs mostly in catastrophic cases when firms go bankrupt or when fraud is involved.

An important characteristic of our model is zero control failures; in equilibrium the manager "behaves" by supplying high productive. How can we then explain any corporate-governance failures? The reason is that the majority of corporate-governance failures have been the result of massive fraud. The goal of our study is not to explain fraud and we do not accept the notion that fraud can be the outcome of equilibrium behavior. Influencing allows the manager to make the BoD interpret information more in favor of the manager, but it does not allow the manager to commit fraud. The manager has the option to make the BoD interpret news as "better" news, but he cannot make the BoD interpret bad news as good news. Thus, influencing cannot be used to facilitate fraud, at least the way modeled in our study. Furthermore, it is important to note that in our model the BoD cannot be "naive" or "captured" by the manager. If the BoD's interests are aligned with the manager's, then, obviously, there will be no oversight. Of course, a BoD captured by the manager makes little sense, since shareholders have to tolerate such a BoD through their votes. Similarly, the BoD knows about the manager's influencing options, and how it can be used to facilitate low productive effort; otherwise the manager extracts rents and can potentially use influencing to facilitate low productive effort.

The BoD serves an important role on every firm. It makes decisions that affect the future of the firm, and of course, the welfare of its shareholders. It seems natural to us that managers influence to serve their interests. Our analysis enhances our understanding of the effects of influencing on the interactions between the BoD and management, and its potential implications on social welfare.

APPENDIX A
PROOFS FOR CHAPTER 3

Proof of Lemma 1

Proof by contradiction: In Program A, assume $s(g,\gamma) < s(b,\gamma)$ motivates high productive effort. If $s(b,\gamma) > s(g,\gamma)$, low productive effort first-order stochastic dominates (FOSD) high productive effort. This means $s(g,\gamma) < s(b,\gamma)$ motivates low productive effort which contradicts the original assumption. $Q.E.D.$

Proof of Proposition 1

It is routine to verify that the following is true:

$$\begin{bmatrix} \pi(g|\theta,\underline{\gamma}) \\ \pi(b|\theta,\underline{\gamma}) \end{bmatrix} = R \cdot \begin{bmatrix} \pi(g|\theta,\overline{\gamma}) \\ \pi(b|\theta,\overline{\gamma}) \end{bmatrix} \quad \forall\ \theta \in \Theta$$

where R is the following stochastic matrix:

$$R = \begin{bmatrix} \frac{\pi_H+\pi_H\overline{\gamma}-\pi_L+\pi_L\overline{\gamma}}{\pi_H+2\overline{\gamma}-\pi_L} & \frac{\overline{\gamma}(\pi_H+\pi_L)}{\pi_H+2\overline{\gamma}-\pi_L} \\ -\frac{\overline{\gamma}(-2+\pi_H+\pi_L)}{\pi_H+2\overline{\gamma}-\pi_L} & -\frac{\pi_L-2\overline{\gamma}+\pi_H\overline{\gamma}-\pi_H+\pi_L\overline{\gamma}}{\pi_H+2\overline{\gamma}-\pi_L} \end{bmatrix}$$

From Grossman and Hart (1983) Proposition 13, the BoD is strictly better off choosing high monitoring intensity. $Q.E.D.$

Proof of Lemma 2

From Proposition 1, if monitoring is costless then monitoring gains are strictly positive:

$$\frac{\partial\left\{E\left[s_\gamma^*|H,\gamma\right]\right\}}{\partial\gamma} < 0$$

Taking the second partial derivative with respect to γ, after some algebra we have

$$\frac{\partial^2 \left\{ E\left[s_\gamma^* | H, \gamma \right] \right\}}{\partial \gamma^2} =$$

$$\frac{\exp(rC) + 1}{r\left[(1 - \pi_H - \gamma)\exp(rC) - (1 - \pi_L + \gamma)\right]} \tag{A-1a}$$

$$+ \frac{(\exp(rC) + 1)(\exp(rC) - 1 + \pi_L + \pi_H)}{r\left[(1 - \pi_H - \gamma)\exp(rC) - (1 - \pi_L + \gamma)\right]^2} \tag{A-1b}$$

$$+ \frac{-\exp(rC) - 1}{r\left[(\pi_L - \gamma) - (\pi_H + \gamma)\exp(rC)\right]} \tag{A-1c}$$

$$+ \frac{(-\exp(rC) - 1)(\pi_L - 1 + \pi_H - \exp(rC))}{r\left[(\pi_L - \gamma) - (\pi_H + \gamma)\exp(rC)\right]^2} \tag{A-1d}$$

$$+ \frac{4}{r(\pi_L - 2\gamma - \pi_H)^2} \tag{A-1e}$$

Careful examination of $\frac{\partial^2 \left\{ E\left[s_\gamma^* | H, \gamma \right] \right\}}{\partial \gamma^2}$ reveals that A-1a is the only negative term.

Combining A-1a and A-1b, after some algebra we have

$$-\frac{1}{r}\frac{(-\exp(rC) - 1)\left[(2 - \pi_H - \gamma)\exp(rC) - (2 + \gamma) + 2\pi_L + \pi_H\right]}{\left[(1 - \pi_H - \gamma)\exp(rC) - (1 - \pi_L + \gamma)\right]^2} \tag{A-2}$$

where for

$$\exp(rC) > \frac{2 + \gamma - 2\pi_L - \pi_H}{2 - \pi_H - \gamma}$$

A-2 is positive which means decreasing returns to monitoring intensity:

$$\frac{\partial^2 \left\{ E\left[s_\gamma^* | H, \gamma \right] \right\}}{\partial \gamma^2} > 0$$

Q.E.D.

APPENDIX B
PROOFS FOR CHAPTER 4

Proof of Lemma 3

Proof similar to proof for Lemma 1.

Proof of Proposition 3

From Lemma 3, to motivate $\theta^{\star} = H$, the BoD sets $s(g,\gamma) > s(b,\gamma)$. Positive influencing FOSD neutral influencing which in turn FOSD negative influencing. This means that for any contract with $s(g,\gamma) > s(b,\gamma)$ the following holds:

$$E\left[U^{M}|s,H,\gamma,\overline{\gamma}\right] > E\left[U^{M}|s,H,\gamma,0\right] > E\left[U^{M}|s,H,\gamma,-\overline{\gamma}\right]$$

Given the assumptions that the BoD always prefers high productive effort and it is always feasible to motivate high productive effort (Condition 3-3), the contract has $s(g,\gamma) > s(b,\gamma)$. In turn, this implies high productive effort is followed by positive influencing, and the BoD cannot motivate the manager to supply high productive effort and any other level of influencing besides positive, $\beta^{\star} = \overline{\gamma}$. *Q.E.D.*

Proof of Proposition 4

For Program B, we expect the manager to maximize the probability of the "g" signal at all times. This implies high productive effort followed by positive influencing. Omitting the obvious constraints then, the relaxed optimization program (Program B'') is

$$\min_{s(y,\gamma),\gamma} \alpha E\left[s|H,\gamma,\overline{\gamma}\right] + c(\gamma)$$

$s.t.$

$$E\left[U^{M}|s,H,\gamma,\overline{\gamma}\right] \geq -1 \qquad (IR)$$

$$E\left[U^{M}|s,H,\gamma,\overline{\gamma}\right] \geq E\left[U^{M}|s,L,\gamma,0\right] \qquad (IC)$$

Solving we find

$$s(g,\gamma) = C - \frac{1}{r}\ln\left(\frac{\pi(b|H,\gamma,\overline{\gamma})\exp(rC) - \pi(b|L,\gamma,0)}{D_1}\right)$$
$$s(b,\gamma) = C - \frac{1}{r}\ln\left(\frac{\pi(g|L,\gamma,0) - \pi(g|H,\gamma,\overline{\gamma})\exp(rC)}{D_1}\right)$$

where $D_1 = \pi(b|H,\gamma,\overline{\gamma})\,\pi(g|L,\gamma,0) - \pi(b|L,\gamma,0)\,\pi(g|H,\gamma,\overline{\gamma})$. Comparing we have $s(g,\gamma) > s(b,\gamma)$. For high productive effort, positive influencing FOSD neutral influencing which FOSD negative influencing, which means the following holds:

$$E\left[U^M|s,H,\gamma,\overline{\gamma}\right] > E\left[U^M|s,H,\gamma,0\right] > E\left[U^M|s,H,\gamma,-\overline{\gamma}\right] \tag{B-1}$$

so the IC_2 constraints in Program B do not bind.

From B-1, the manager's undominated strategies are high productive effort followed by positive influencing and, of course, low productive effort followed by no-influencing. It is routine to verify that for Program B'' the following is true:

$$\begin{bmatrix} \pi(g|H,\gamma,0) \\ \pi(b|H,\gamma,0) \end{bmatrix} = R_1 \cdot \begin{bmatrix} \pi(g|H,\gamma,\overline{\gamma}) \\ \pi(b|H,\gamma,\overline{\gamma}) \end{bmatrix}$$

and

$$\begin{bmatrix} \pi(g|L,\gamma,0) \\ \pi(b|L,\gamma,0) \end{bmatrix} = R_1 \cdot \begin{bmatrix} \pi(g|L,\gamma,0) \\ \pi(b|L,\gamma,0) \end{bmatrix}$$

where R_1 is the following stochastic matrix:

$$R_1 = \begin{bmatrix} \frac{\pi_H - \pi_L + \overline{\gamma}\pi_L}{\pi_H + \overline{\gamma} - \pi_L} & \frac{\overline{\gamma}\pi_L}{\pi_H + \overline{\gamma} - \pi_L} \\ \frac{(1-\pi_L)\overline{\gamma}}{\pi_H + \overline{\gamma} - \pi_L} & \frac{\pi_H - \pi_L + \overline{\gamma} - \overline{\gamma}\pi_L}{\pi_H + \overline{\gamma} - \pi_L} \end{bmatrix}$$

Again, from Grossman and Hart (1983) Proposition 13, expected compensation cost is lower in the conditional influencing case relative to the benchmark case. $Q.E.D.$

Proof of Corollary 2

It is routine to verify that the following is true:

$$\begin{bmatrix} \pi\left(g|H,\underline{\gamma},\overline{\gamma}\right) \\ \pi\left(b|H,\underline{\gamma},\overline{\gamma}\right) \end{bmatrix} = R_2 \cdot \begin{bmatrix} \pi\left(g|H,\overline{\gamma},0\right) \\ \pi\left(b|H,\overline{\gamma},0\right) \end{bmatrix}$$

and

$$\begin{bmatrix} \pi\left(g|L,\underline{\gamma},0\right) \\ \pi\left(b|L,\underline{\gamma},0\right) \end{bmatrix} = R_2 \cdot \begin{bmatrix} \pi\left(g|L,\overline{\gamma},0\right) \\ \pi\left(b|L,\overline{\gamma},0\right) \end{bmatrix}$$

where R_2 is the following stochastic matrix:

$$R_2 = \begin{bmatrix} \frac{\pi_H+\pi_H\overline{\gamma}+\overline{\gamma}+\overline{\gamma}^2-\pi_L}{\pi_H+2\overline{\gamma}-\pi_L} & \frac{\pi_H\overline{\gamma}+\overline{\gamma}^2}{\pi_H+2\overline{\gamma}-\pi_L} \\ \frac{\overline{\gamma}-\pi_H\overline{\gamma}-\overline{\gamma}^2}{\pi_H+2\overline{\gamma}-\pi_L} & \frac{-\pi_L+2\overline{\gamma}-\pi_H\overline{\gamma}-\overline{\gamma}^2+\pi_H}{\pi_H+2\overline{\gamma}-\pi_L} \end{bmatrix}$$

Again, from Grossman and Hart (1983) Proposition 13, the shareholders are strictly better off in the benchmark case with high monitoring than the conditional influencing case with low monitoring. $Q.E.D.$

Proof of Lemma 4

Proof similar to proof for Lemma 1. $Q.E.D.$

Proof of Proposition 5

The BoD's optimization program (Program C') is the following:

$$\min_{s(y,\gamma),\gamma} \alpha E\left[s|H,\gamma,\beta^*\right] + c\left(\gamma\right)$$

$s.t.$

$$E\left[U^M|s,H,\gamma,\beta^*\right] \geq -1 \qquad (IR)$$

$$E\left[U^M|s,H,\gamma,\beta^*\right] \geq E\left[U^M|s,L,\gamma,\beta_1^*\right] \qquad (IC_1)$$

$$E\left[U^M|s,H,\gamma,\beta^*\right] \geq E\left[U^M|s,H,\gamma,\beta\right] \ \forall\ \beta \neq \beta^* \in B \qquad (IC_2)$$

$$E\left[U^M|s,L,\gamma,\beta_1^*\right] \geq E\left[U^M|s,L,\gamma,\beta\right] \ \forall\ \beta \neq \beta_1^* \in B \qquad (IC_3)$$

The IC_3 constraints ensure the manager chooses β_1^* influencing level given low productive effort. Note β_1^* may be different from the manager's optimal influencing choice given high productive effort β^*. The combination of the IC_1, IC_2 and IC_3 constraints ensures the manager supplies high productive effort and β^* influencing. Intuitively, we expect the manager to maximize the probability of the "g" signal at all times. This implies high productive effort followed by positive influencing, and low productive effort followed by negative influencing. Omitting the obvious constraints then, the relaxed optimization program (Program C) becomes

$$\min_{s(y,\gamma),\gamma} \alpha E\left[s|H,\gamma,\overline{\gamma}\right] + c\left(\gamma\right)$$

$$s.t.$$

$$E\left[U^M|s,H,\gamma,\overline{\gamma}\right] \geq -1 \qquad (IR)$$

$$E\left[U^M|s,H,\gamma,\overline{\gamma}\right] \geq E\left[U^M|s,L,\gamma,-\overline{\gamma}\right] \qquad (IC)$$

Solving we find

$$s\left(g,\gamma\right) = C - \frac{1}{r}\ln\left(\frac{\pi\left(b|H,\gamma,\overline{\gamma}\right)\exp\left(rC\right) - \pi\left(b|L,\gamma,-\overline{\gamma}\right)}{D_2}\right)$$

$$s\left(b,\gamma\right) = C - \frac{1}{r}\ln\left(\frac{-\pi\left(g|H,\gamma,\overline{\gamma}\right)\exp\left(rC\right) + \pi\left(g|L,\gamma,-\overline{\gamma}\right)}{D_2}\right)$$

where $D_2 = \pi\left(b|H,\gamma,\overline{\gamma}\right)\pi\left(g|L,\gamma,-\overline{\gamma}\right) - \pi\left(b|L,\gamma,-\overline{\gamma}\right)\pi\left(g|H,\gamma,\overline{\gamma}\right)$. Comparing we have $s\left(g,\gamma\right) > s\left(b,\gamma\right)$. For high productive effort, positive influencing FOSD neutral influencing which FOSD negative influencing, and for low productive effort, negative influencing FOSD neutral influencing which FOSD positive influencing, which means the following hold:

$$E\left[U^M|s,H,\gamma,\overline{\gamma}\right] > E\left[U^M|s,H,\gamma,0\right] > E\left[U^M|s,H,\gamma,-\overline{\gamma}\right]$$

$$E\left[U^M|s,L,\gamma,-\overline{\gamma}\right] > E\left[U^M|s,L,\gamma,0\right] > E\left[U^M|s,L,\gamma,\overline{\gamma}\right]$$

so that the IC_2, and IC_3 in Program C' are satisfied. $Q.E.D.$

Proof of Corollary 3

Program B is a relaxed version of Program C. $Q.E.D.$

Proof of Proposition 6

It is routine to verify that for monitoring γ the following is true:

$$\begin{bmatrix} \pi(g|H,\gamma,0) \\ \pi(b|H,\gamma,0) \end{bmatrix} = R_3 \cdot \begin{bmatrix} \pi(g|H,\gamma,\beta^+) \\ \pi(b|H,\gamma,\beta^+) \end{bmatrix}$$

and

$$\begin{bmatrix} \pi(g|L,\gamma,0) \\ \pi(b|L,\gamma,0) \end{bmatrix} = R_3 \cdot \begin{bmatrix} \pi(g|L,\gamma,\beta^-) \\ \pi(b|L,\gamma,\beta^-) \end{bmatrix}$$

where R_3 is the following stochastic matrix:

$$R_3 = \begin{bmatrix} \frac{\pi_H+2\gamma-\pi_L+\beta^-(\pi_H+\gamma)+\beta^+(\pi_L-\gamma)}{\pi_H+2\gamma+\beta^+-\pi_L+\beta^-} & \frac{\beta^-(\pi_H+\gamma)+\beta^+(\pi_L-\gamma)}{\pi_H+2\gamma+\beta^+-\pi_L+\beta^-} \\ \frac{\beta^-(1-\pi_H-\gamma)+\beta^+(1-\pi_L+\gamma)}{\pi_H+2\gamma+\beta^+-\pi_L+\beta^-} & \frac{\pi_H-\pi_L+2\gamma+\beta^-(1-\pi_H-\gamma)+\beta^+(1-\pi_L+\gamma)}{\pi_H+2\gamma+\beta^+-\pi_L+\beta^-} \end{bmatrix}$$

If every element of R_3 is positive, from Grossman and Hart (1983) Proposition 13, influencing is efficient. It is easily verifiable that every element of R_3 is positive if

$$\beta^+ > \max\left\{\frac{-\beta^-(\pi_H+\gamma)}{(\pi_L-\gamma)}, \frac{-\beta^-(1-\pi_H-\gamma)}{(1-\pi_L+\gamma)}\right\}$$

Q.E.D.

APPENDIX C
PROOFS FOR CHAPTER 5

Proof of Lemma 5

The manager in equilibrium supplies high productive effort and neutral influencing. This implies

$$E\left[U^M|s^*_{\gamma,\beta=0}, H, \gamma, \beta = 0\right] \geq E\left[U^M|s^*_{\gamma,\beta=0}, H, \gamma, \beta = \overline{\gamma}\right] =$$
$$\sum_y \pi\left(y|H, \gamma, \beta = \overline{\gamma}\right)\left\{-\exp\left[-r\left(s^*_{\gamma,\beta=0} - C - C_\beta\right)\right]\right\}$$

Hence,

$$\frac{E\left[U^M|s^*_{\gamma,\beta=0}, H, \gamma, \beta = 0\right]}{\sum_y \pi\left(y|H, \gamma, \beta = \overline{\gamma}\right)\left\{-\exp\left[-r\left(s^*_{\gamma,\beta=0} - C\right)\right]\right\}} \leq \exp\left(rC_\beta\right)$$

Thus,

$$\exp\left(rC_\beta\right) \geq \frac{E\left[U^M|s^*_{\gamma,\beta=0}, H, \gamma, \beta = 0\right]}{\sum_y \pi\left(y|H, \gamma, \beta = \overline{\gamma}\right)\left\{-\exp\left[-r\left(s^*_{\gamma,\beta=0} - C\right)\right]\right\}}$$

implies

$$E\left[U^M|s^*_{\gamma,\beta=0}, H, \gamma, \beta = 0\right] \geq E\left[U^M|s^*_{\gamma,\beta=0}, H, \gamma, \beta = \overline{\gamma}\right]$$

Q.E.D.

Proof of Proposition 7

In the conditional influencing case, the BoD sets $s\left(g, \gamma\right) > s\left(b, \gamma\right)$ to motivate $\theta^* = H$. It is easy to verify that for $s\left(g, \gamma\right) > s\left(b, \gamma\right)$ and any C_β we have

$$E\left[U^M|s, H, \gamma, \beta = \overline{\gamma}\right] > E\left[U^M|s, H, \gamma, \beta = -\overline{\gamma}\right] \tag{C-1}$$

which means that positive influencing dominates negative influencing. Also, if condition 5-1 does not hold $\forall\ \gamma \in \Gamma$, neutral influencing cannot be the equilibrium level of influencing. By construction,

$$E\left[U^M|s, H, \gamma, \beta = \overline{\gamma}\right] > E\left[U^M|s, H, \gamma, \beta = 0\right] \tag{C-2}$$

From C-1 and C-2, if the BoD motivates $\theta^{\star} = H$ and condition 5-1 does not hold, the manager supplies positive influencing and the BoD cannot prevent him from influencing, $\beta^{\star} = \overline{\gamma}$. *Q.E.D.*

Proof of Proposition 8

From Lemma 5, under contract $s^{*}_{\gamma,\beta=0}$ the manager does not influence if and only if

$$\exp(rC_{\beta}) > \frac{E\left[U^{M}|s^{*}_{\gamma,\beta=0}, H, \gamma, \beta = 0\right]}{\sum_{y} \pi\left(y|H, \gamma, \beta = \overline{\gamma}\right)\left\{-\exp\left[-r\left(s^{*}_{\gamma,\beta=0} - C\right)\right]\right\}}$$

Notice that $\exp(rC_{\beta})$ is a constant and from the previous analysis, $E[U^{M}|s^{*}_{\gamma,\beta=0}, H, \gamma, \beta = 0] = -\exp(-ri) = -1$ for all levels of monitoring. This implies the monitoring intensity level only affects the denominator:

$$\sum_{y} \pi\left(y|H, \gamma, \beta = \overline{\gamma}\right)\left\{-\exp\left[-r\left(s^{*}_{\gamma,\beta=0} - C\right)\right]\right\} \quad \text{(C-3)}$$

We have already established that the manager always receives his reservation utility regardless of the monitoring intensity level, which means

$$E\left[U^{M}|s^{*}_{\gamma=0,\beta=0}, H, \gamma, \beta = 0\right] = E\left[U^{M}|s^{*}_{\gamma=\overline{\gamma},\beta=0}, H, \gamma = \overline{\gamma}, \beta = 0\right] = -1 \quad \text{(C-4)}$$

Combining C-3 with C-4 and after some algebra we get that C-3, for $\gamma = 0$ and $\beta = \overline{\gamma}$, can be rewritten as

$$-1 + \overline{\gamma}\exp(rC)\left\{-\exp\left[-r \cdot s_{\beta=0}(g, \gamma = 0)\right] + \exp\left[-r \cdot s_{\beta=0}(b, \gamma = 0)\right]\right\} \quad \text{(C-5)}$$

Similarly, for $\gamma = \overline{\gamma}$ C-3 can be rewritten as

$$-1 + \overline{\gamma}\exp(rC)\left\{-\exp\left[-r \cdot s_{\beta=0}(g, \gamma = \overline{\gamma})\right] + \exp\left[-r \cdot s_{\beta=0}(b, \gamma = \overline{\gamma})\right]\right\} \quad \text{(C-6)}$$

Taking the difference between C-5 and C-6 and simplifying we get

$$\overline{\gamma}\exp(rC)\left\{-\exp\left[-r \cdot s_{\beta=0}(g, \gamma = 0)\right] + \exp\left[-r \cdot s_{\beta=0}(b, \gamma = 0)\right] + \right.$$
$$\left.\exp\left[-r \cdot s_{\beta=0}(g, \gamma = \overline{\gamma})\right] - \exp\left[-r \cdot s_{\beta=0}(b, \gamma = \overline{\gamma})\right]\right\} > 0 \quad \text{(C-7)}$$

since it is easy to verify that $-\exp\left[-r \cdot s_{\beta=0}(g, \gamma = 0)\right] + \exp\left[-r \cdot s_{\beta=0}(g, \gamma = \overline{\gamma})\right] > 0$ and $-\exp\left[-r \cdot s_{\beta=0}(b, \gamma = \overline{\gamma})\right] + \exp\left[-r \cdot s_{\beta=0}(b, \gamma = 0)\right] > 0$.

From C-7, C-3 is increasing in monitoring intensity, which means that $\frac{E\left[U^{M}|s^{*}_{\gamma,\beta=0}, H, \gamma, \beta=0\right]}{\sum_{y} \pi(y|H,\gamma,\beta=\overline{\gamma})\left[-\exp\left[-r\left(s^{*}_{\gamma,\beta=0} - C\right)\right]\right]}$ is smaller for high monitoring. *Q.E.D.*

Proof of Corollary 8

Similar to the proof of Lemma 5, in the unconditional influencing case with personally costly influencing, for $s^*_{\gamma,\beta=0}$ the manager's best alternative following low productive effort is neutral influencing if and only if the following condition holds

$$\exp(rC_\beta) \geq \frac{E\left[U^M | s^*_{\gamma,\beta=0}, H, \gamma, \beta = 0\right]}{\sum_y \pi(y|L,\gamma,\beta=-\overline{\gamma})\left\{-\exp\left(-rs^*_{\gamma,\beta=0}\right)\right\}} \tag{C-8}$$

where $s^*_{\gamma,\beta=0}$ is the optimal compensation contract offered to the manager under monitoring intensity γ and neutral influencing, $\beta = 0$.

We know that for the benchmark case, the IC is binding:

$$E\left[U^M | s^*_{\gamma,\beta=0}, H, \gamma, \beta = 0\right] = E\left[U^M | s^*_{\gamma,\beta=0}, L, \gamma, \beta = 0\right], \text{ or}$$

$$\sum_y \pi(y|H,\gamma,\beta=\overline{\gamma})\left\{-\exp\left[-r\left(s^*_{\gamma,\beta=0} - C - C_\beta\right)\right]\right\} =$$

$$\sum_y \pi(y|L,\gamma,\beta=-\overline{\gamma})\left\{-\exp\left[-r\left(s^*_{\gamma,\beta=0} - C_\beta\right)\right]\right\} \tag{C-9}$$

because of the assumed symmetry between positive and negative influencing and also because positive and negative influencing carry the same cost.

We have also established that in the conditional influencing case the manager does not influence if the following condition holds:

$$\exp(rC_\beta) \geq \frac{E\left[U^M | s^*_{\gamma,\beta=0}, H, \gamma, \beta = 0\right]}{\sum_y \pi(y|H,\gamma,\beta=\overline{\gamma})\left\{-\exp\left[-r\left(s^*_{\gamma,\beta=0} - C\right)\right]\right\}} \tag{C-10}$$

Combining C-10 with C-9 we get

$$\exp(rC_\beta) \geq \frac{E\left[U^M | s^*_{\gamma,\beta=0}, H, \gamma, \beta = 0\right]}{\sum_y \pi(y|H,\gamma,\beta=\overline{\gamma})\left\{-\exp\left[-r\left(s^*_{\gamma,\beta=0} - C\right)\right]\right\}} =$$

$$\frac{E\left[U^M | s^*_{\gamma,\beta=0}, H, \gamma, \beta = 0\right]}{\sum_y \pi(y|L,\gamma,\beta=-\overline{\gamma})\left\{-\exp\left[-rs^*_{\gamma,\beta=0}\right]\right\}}$$

which means that if the manager does not influence in the conditional influencing case, from C-8 he does not influence in the unconditional influencing case. $Q.E.D.$

APPENDIX D
PROOFS FOR CHAPTER 6

Proof of Proposition 9

Proof by contradiction: In Program D, assume that the BoD cannot ensure high productive effort followed by no-influencing. Let $s_1(x,\gamma)$ denote the optimal compensation contract that ensures high productive effort and uses only firm output and monitoring intensity as the contracting variables. Condition 6-2 ensures contract $s_1(x,\gamma)$ is feasible. Set $s^*(\overline{x},g,\gamma) = s^*(\overline{x},b,\gamma) = s_1(\overline{x},\gamma)$ and $s^*(\underline{x},g,\gamma) = s^*(\underline{x},b,\gamma) = s_1(\underline{x},\gamma)$. It is easily verifiable that $E\left[U^M|s^*,H,\gamma,\beta=0\right] > E\left[U^M|s^*,H,\gamma,\beta\neq 0\right]$ and $E\left[U^M|s^*,L,\gamma,\beta=0\right] > E\left[U^M|s^*,L,\gamma,\beta\neq 0\right]$ because $s_1(\overline{x},\gamma) > s_1(\underline{x},\gamma)$. Also, by definition $s_1(x,\gamma)$ ensures high productive effort which means that $s^*(x,y,\gamma)$ ensures high productive effort followed by no-influencing and contradicts the original assumption. $Q.E.D.$

Proof of Proposition 11

It is routine to verify the following:

$$\begin{bmatrix} \pi(\overline{x}|H,\beta\neq 0) \\ \pi(\underline{x}|H,\beta\neq 0) \end{bmatrix} = R_5 \cdot \begin{bmatrix} \pi(\overline{x}|H,\beta=0) \\ \pi(\underline{x}|H,\beta=0) \end{bmatrix}$$

and

$$\begin{bmatrix} \pi(\overline{x}|L,\beta\neq 0) \\ \pi(\underline{x}|L,\beta\neq 0) \end{bmatrix} = R_5 \cdot \begin{bmatrix} \pi(\overline{x}|L,\beta=0) \\ \pi(\underline{x}|L,\beta=0) \end{bmatrix}$$

where R_5 is the following stochastic matrix:

$$R_5 = \begin{bmatrix} \frac{\pi_H-\delta+\delta\pi_L-\pi_L}{\pi_H-\pi_L} & \frac{\delta\pi_L}{\pi_H-\pi_L} \\ \frac{(1-\pi_L)\delta}{\pi_H-\pi_L} & \frac{-\pi_L-\delta\pi_L+\pi_H}{\pi_H-\pi_L} \end{bmatrix} \quad Q.E.D.$$

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BIOGRAPHICAL SKETCH

George Drymiotes was born on March 13, 1975, in Paphos, Cyprus. After graduating from St. Joseph High School in June 1993, he joined the National Guard of Cyprus. He served at the rank of Second Lieutenant until September 1995. He then attended the University of Cyprus, where he earned his bachelor's degree in business administration with concentration in management science, in June 1999. He then came to the United States to join the doctoral program in accounting at the University of Florida's Fisher School of Accounting. He is expected to graduate with a PhD degree in 2004.

INFLUENCING ON BOARDS

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Boards of directors make decisions that affect managers' welfare. This implies managers may spend time and effort trying to affect the decision-making process of boards. Our study developed a theory on influencing between the board of directors and management. With influencing, the manager can make directors interpret information more in favor of the manager relative to no-influencing cases. We explore how influencing affects the board's and management's actions with emphasis on the effects of influencing on the effectiveness of boards as corporate governance mechanisms. Our study highlights the endogenous nature of monitoring and influencing and shows that influencing can be beneficial to boards and shareholders. Emphasis is placed on the interactions between managers and board, and its overall effects on the role of boards as corporate governance mechanisms. Understanding the dynamic nature of the interactions between the board and management is valuable, especially in light of recent corporate governance failures.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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Frederick E. Fisher Eminent Scholar of Accounting

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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